KIPP & ZONEN
SINCE 1830

Brewer MkIII

Spectrophotometer

Service manual

REVISION HISTORY				
REV	DESCRIPTION	DCN #	DATE	APPD
-	Initial Release	-----	98-11-06	TKLL
A	New Brewer Electronics	822	99-02-01	TKLL
B	Updated	868	99-08-13	
C	Updated	55	05-10-21	KBo
D	Updated	9	06-02-03	KBo
E	Hamamatsu PMT		08-11-14	KBo

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Recommendations by Environment Canada

Mark III Brewer Ozone Spectrophotometers are recommended by Environment Canada (EC) as the significantly superior model of Brewer instrument with which to measure ozone in the ultraviolet (UV) region of the spectrum. EC strongly discourages the use of other models of the Brewer instrument for the measurement of ultraviolet radiation or ozone in the UV because of the much poorer stray light performance of the single monochromator versions of the instrument.

PREFACE

This document has been developed to aid an operator when a Brewer Spectrophotometer stops operating or whose operating characteristics have changed since leaving KIPP & ZONEN B.V.. It has been developed from the experience of KIPP & ZONEN and present users of the Brewer. The most likely electronic failures and ones which can be repaired in the field have been documented.

1 PURPOSE AND APPLICATION

The purpose of this manual is to help the operator diagnose problems with a Brewer Spectrophotometer to an assembly level. Component level diagnostics will not be covered since the replacement of many components may require instrument realignment or re-calibration. Potentiometers should not be adjusted nor set screws removed without completely defining the problem area. If the information in this document is not sufficient, it is recommended that the user contact KIPP & ZONEN before dismantling of any assemblies beyond what is called for in this manual.
In several cases the operator will be asked to replace components that are not included in spares kits. In these cases please contact KIPP & ZONEN for information on obtaining the component.

2 EQUIPMENT REQUIRED

1) Volt-Ohmmeter, capable of measuring from 1 mV to 2000 volts DC.

2). A clip on or in-line current meter.

3). In place of the above items, a digital Volt-Ohmmeter, such as the one contained in the KIPP & ZONEN UV Stability Kit is adequate except for Voltage readings of greater than 1000V.

4) An oscilloscope may be useful (1 millivolt; 20 megahertz bandwidth).

5) An external UVB lamp may be useful when the internal quartz-halogen lamp appears at fault.

6) If the control computer is suspect, a second computer with Brewer software loaded may be needed.

7) A terminal communications program such as Telix, Procomm, Xtalk or Windows HyperTerminal.

3 MAJOR EQUIPMENT FAILURES

A major equipment failure is defined as a condition where there is no communication between the Brewer Spectrophotometer (Brewer) and the external control computer (PC). Symptoms are that no commands go to the Brewer, and no information is received by the PC. This is a "no operation" condition.

3.1 "NO OPERATION" - NO POWER INDICATION

1. Reset the Brewer
If any problem is fixed at any point in this trouble shooting procedure attempt to launch the Brewer Software.
When the Brewer Software is launched the Brewer should send the following message to the PC:

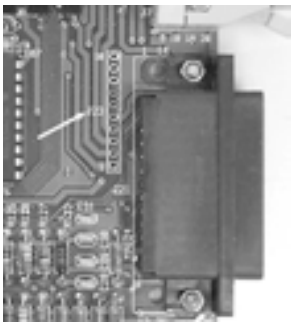
```
BREWER OZONE SPECTROPHOTOMETER

#nnnnn

AES SCI-TEC

CANADA

VERSION 1 Jan 01, 1998
```

If this message is received then communications has been established between the Brewer and the control computer.
If the instrument does not reset (as seen by motors initializing), the problem is probably in the Brewer, but may also be in the communications cable, the PC or the software.
A fresh set of software can be loaded onto the Computer from the original discs to eliminate it as a potential problem. Ensure that the Brewer configuration files are preserved as they contain important operating information such as the COM: port number. Check the configuration files to ensure that none of the files have been corrupted.

2. Check Power
If the GREEN LED on the Brewer is illuminated, then there is power to the instrument, and the Main Power Supply is producing 5V. If the LED is not illuminated, then the AC power source should be checked at the AC outlet and the end to end continuity of the Power Cable tested. The AC power should then be connected directly to the Brewer, bypassing the Tracker.
If there is still a no-power indication, then the Brewer top cover should be removed and the MAIN power supply checked to see if it feels warmer than ambient.

3. Check Power Switch and Fuses
If the cover is not warm, then perhaps the Power Switch is defective, or a fuse requires replacement. With power disconnected, use an Ohmmeter to confirm that the Switch is functional, and check the two fuses next to the power supply cover as indicated in the photograph. If a fuse needs changing, ensure that AC power is disconnected, and replace the fuse with the appropriate spare.
To check the fuse inside the power supply, disconnect AC power from the Brewer, remove the Main Power Supply cover (four 6-32 screws) and measure or visually inspect the fuse and replace it if necessary. When re-installing the cover, ensure that the Power Supply connectors remain connected.

If the power supply appears to be normal, then the LED may be defective, or there may be a faulty connection.



4. Measure Voltages
The main power supply voltages can be checked at the test points on J23 of the Main Electronics board. (Refer to the chart for correct voltages).

Connector J23 Monitor points	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10
	5v	5v	-5v	12v	12v	-12v	24v	2.5v	4.5v	Gnd

3.2 TROUBLE SHOOTING SEQUENCE FOR "NO OPERATION" CONDITION

It has been established that there is Power, motors reset, but that there is absolutely no communication between the PC and the Brewer.

1. Reset
A software reset should be attempted after the "Brewer Failed to Respond" message appears on the PC monitor, or the PC has tried a number of times to establish contact with the Brewer. The software reset is done by pressing ⏎ key on the PC following the error message, or launching the Brewer software from the DOS prompt. If this fails to establish communications, the PC should be given a 'cold' boot (power OFF/ON).

2. Check cables
If there is still no response, the cables should be inspected to ensure that a connector has not been inadvertently removed or pulled out of place. The Communications cable to the Brewer from the PC, as well as the power cable to the Brewer should be checked. All cables involving the linking of peripherals should be checked to ensure that they are plugged in as well. After this has been done another software reset can be tried.

3. Test serial port
Check that the computer serial port is operating correctly by running a serial communications program such as Telix, Procomm, or Windows Hyper Terminal. Make sure the serial communications program is set to 1200 baud, is in full duplex mode, and the correct serial port has been selected. Refer to the communications program documentation for correct operation. Remove the RS422 adapter from the back of the computer and connect pins 2 and 3 of the computer serial port together. While running the communications program in full Duplex mode, characters typed should be seen echoing to the monitor. Disconnecting the jumper wire should stop the echo-back. This test confirms that the computer serial port is operating correctly. If the computer did not echo the characters change the Brewer's configuration to use another port (see section 3.6 in the Operator's Manual) or have the defective serial port repaired before doing any further tests.

4. Test RS422 adapter

The RS422 adapter at the computer can be tested by removing the communications cable from the adapter, connecting pins 1-3, plugging the adapter into the Computer COM: port, and checking for echo-back as in step 3. Now switch connections to pins 2-4 and test again. The RS422 adapter is operating correctly if characters echo back. If a fault is indicated, then either the adapter or the power module is defective.

The power module output should be approximately +13V DC with no load or +9V with a load (the centre pin is positive.) If the voltage is normal, then replace the RS422 adapter and test again.

5. Test communications cable

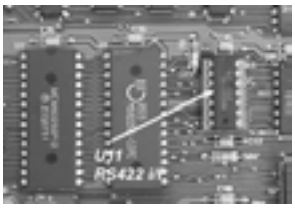
If the tests have passed to this point, the communications cable between the Brewer and the computer can be tested. Reconnect the cable to the RS422 adapter and connect it back to the computer. Remove the communications cable from the Tracker surge suppressor box and connect a wire jumper to connect pins C-B. Test the cable by sending characters from the computer as in step 3; move the jumper to connect pins I-J and test it again.

Reconnect the communication cable to the tracker and disconnect the communications cable at the Brewer. Short pins C-B and then pins I-J and test as in step 4. If the test passes, reconnect the cable to the Brewer and open the cover of the Brewer. Turn the power off and disconnect the IDC connector (the IDC connector,J7, is the connector attached to the shielded ribbon cable shown in the picture below) Use a small wire jumper to connect pins 2-8, and then pins 4-6, using the echo-back test each time. (The IDC pins begin from 1 at the triangle stamped on the side of the connector and increment in odd numbers on the same row - 1, 3, 5, 7, 9 on the first row and 2, 4, 6, 8, 10 on the next row, in the same direction). If the test fails at any point of this cable test procedure the faulty connection should be repaired before proceeding to the next test. If all of these procedures have positive results, then the problem lies in the Brewer Main Electronics Board. Reconnect all the cabling to the instrument and continue to the next test.

As an alternative for testing cables, each line can be tested for continuity by measuring point to point with a ohmmeter, using the appropriate schematic as a guide. The resistance through the surge arrestor is 10 ohms so that a typical resistance should be 12 ohms from the RS422 adapter to the IDC connector at the Brewer Main Electronics board.

6. Line Driver

If the reset of the motors is heard and seen, but there is no message sent to the PC, then there may be a problem with the line driver on the Main Electronics board. Ensure that power is turned off and remove the Main Electronics cover plate and replace IC U11, (on a socket 2 inches up and 2 inches to the left of the LED). Make sure to use proper grounding precautions before touching the electronics board. Leave the cover plate off and turn on the instrument. The motors should be observed to reset and if the computer was left in the serial communications program, the Brewer reset message will be displayed on the screen. Exit the communications program and launch the Brewer operating program. Normal Brewer commands can be used for checking correct operation.



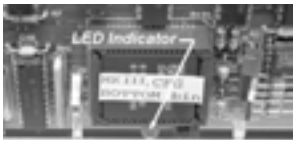
7. Check Mode of Microprocessor

If there is still no operation, there may be a firmware problem, or a problem on the Main Electronics Board, so the functionality of this board should be tested.

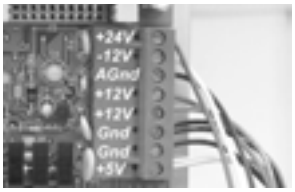
There is a Red status LED located near the bottom left hand side of the board - it should be flashing slowly in 'Cosmac mode' as per the following table. If the Brewer is in some other mode change back to the Cosmac mode (step 10).

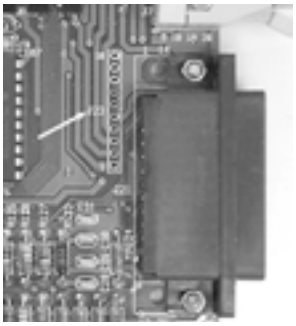
LED Mode indication	¼sec	¼sec	¼sec	¼sec	¼sec	¼sec	¼sec	¼sec
Cosmac mode normal operation	**On**	Off	Off	Off	**On**	**On**	**On**	Off
Cosmac mode with configuration missing	**On**	Off	Off	Off	**On**	Off	**On**	Off
Loadmode waiting for code to be downloaded	**On**	Off	**On**	Off	**On**	Off	**On**	Off
Loadmode with bad flash memory	**On**	**On**	**On**	**On**	Off	Off	Off	Off
Loadmode with good flash memory	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off
Opmode with configuration present	**On**	**On**	Off	Off	**On**	**On**	Off	Off
Opmode without configuration present	**On**	**On**	Off	Off	**On**	Off	**On**	Off
Checking Flash memory	**On**	Off	**On**	Off	Off	Of	Off	Off
Changing from load to cosmac or load mode	**On**	**On**	**On**	**On**	**On**	**On**	**On**	**On**

8. Check Voltages
If the LED is not flashing, then the correct voltages should be confirmed for the power supply on the Main Electronics board J23, as per section 3.1.

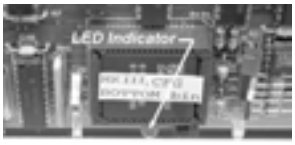


9. Test Main Power Supply
If the power supply values have changed, the power connections should be checked. If they appear normal, and the voltages are still not at proper levels, replacement should be considered. However, there may be a short circuit in one of the assemblies causing the power supply to be loaded. Shut the power off and disconnect the power connector J1 from the Main Electronics board and from the J4 Lamp control board. Repeat the voltage measurements at the connector and see if all the voltages are present. If the voltages are correct then determine which assembly is at fault by installing the connectors one at a time. Replace the main power supply if necessary, and ensure when first turned on that the assemblies are disconnected to allow setup of voltages to correct values. The main 5 volts monitored at the main board should be set to 5.0 volts with the single potentiometer on the main power supply.





10. Restore Brewer to Cosmac Mode
If the flashing LED on the Main Electronics board indicates that it is not in the cosmac mode, and the software has not been successful in correcting it during the Reset sequence, then the following procedure should be followed:



A. Exit the serial communications program and change to the subdirectory c:\bdata\nnn.

B.Type **BREWCMD** ↵, and observe that the instrument has responded and note which mode is indicated. The program should display the same mode as the mode observed on the status LED.

C. If the mode is 'cosmac mode' then type **loadmode** ↵, and the display should return indicating 'loadmode'. Now type **opmode** ↵ and within a few seconds the Brewer will be in opmode.

D. Type **readlog** ↵ to display past error history, each line displayed will be a possible clue to the problem that caused the failure. If motor failures have occurred, the status will tell you which motor and what the failure is. Usually it is a sensor problem or a wiring problem that prevents the motor from resetting. If no problems are displayed, then the system can be placed back into cosmac mode for further testing.

E. Type **loadmode** ↵ and following the return of the prompt, type **cosmacmode** ↵. The motors will reset and within a minute the system will display the status that it is in cosmac mode.

F. Quit the Brewcmd program by typing **quit** ↵.

11. Run Brewer Software.

Run the Brewer operating program by typing **BREWER** ↵ to check the correct operation of the instrument. Select routines that you are familiar with and ensure that all functions and data appear normal.

12. Replace Main Electronics Board

If no communications return when running Brewcmd then there may be a problem with the Main Electronics Board.
Replace the Main Electronics board with a spare board, ensuring that all cables are reconnected to the original connectors. Normally the spare Main Electronics board is preloaded with the same parameters as those that came with the instrument. Therefore no reprogramming or uploading of the configuration parameters are needed. If the configuration parameters have changed, then refer to the procedure to upload new firmware and configuration data to the board, section 8.

The main board has a number of flat cables attached to it. The following lists the connectors for the flat cables and the electronics they are connected with. “Top” (at the front) stands for pins 1-16. “Bottom” (at the back) are pins 17-32:

J2 top	BA-W77/A	Lamp Board
J2 bottom	BA-W77/B	J1 on hv module
J13 top	BA-W76/B	iris
J13 bottom	BA-W76/A	zenith
J14 top	BA-W76/B	fw #1
J14 bottom	BA-W76/B	fw#2
J15 top	BA-W76/A	micrometer #2 (MKIII only)
J15 bottom	BA-W76/A	micrometer #1
J16 bottom	BA-W76/C	fw#3 (MK IV only}
J17 top	BA-W76/B	slitmask (shutter)
J17 bottom	BA-W76/A	azimuth
J12 top	BA-W76/A	control switch’s
J7 top		Communication
J7 bottom		humidity sensor

13. Contact KIPP & ZONEN

If you have followed this procedure and not located the problem contact KIPP & ZONEN for further assistance.

Webpage: www.kippzonen.com
Email: info.holland@kippzonen.com

4 OPERATING TEST FAILURES

In the Brewer Spectrophotometer, most of the operating tests are done using either the mercury lamp or the quartz-halogen lamp. If any of the other tests fail, the user should proceed immediately to a mercury lamp test (HG) or a standard lamp test (SL).
Mercury lamp test failures and standard lamp test failures are two major problems which can occur. In both cases calibration of the instrument may have been compromised. For the purpose of troubleshooting, these two sections have been separated from the main part of the instrument.
The Light Detection System is made up of the zenith prism, foreoptics, spectrometer, slitmask, PMT, High Voltage Circuitry, High Speed Amplifier (part of the PMT), interconnecting harnesses, and the Main Electronics board which houses the photon counting circuits. Without this section being operational, no testing, or measuring, can be done.
There are a few points to remember in the event there is a major failure somewhere in the system, whether it is the Mercury Lamp, Standard Lamp, or Light Detection System.
The error message "**`lamp not on test terminated`**" is an indication of a failure, either in the lamps or in the Light Detection System.
Changes in dark count may be symptomatic of a number of problems which may occur in the Brewer.
If Dark Count begins to increase or becomes erratic, the slitmask may be at fault. Note that it is normal for Dark Count to increase with temperature.
Dark Count changes may also indicate motor power supply problems, PMT performance problems, or High Speed Amplifier problems.
If the dark count changes, there may be a changing optical condition in the Light Detection System. A higher dark count can also be the result of a poor ground somewhere in the system or high humidity inside the instrument. Grounding connections should be checked, especially between the PMT housing and the Main Electronics.
The desiccant should be changed more frequently in higher humidity locations.

4.1 MERCURY LAMP CIRCUIT

The Mercury lamp circuitry (Fig 10-4.2) is a constant current source designed to keep the lamp current constant throughout the temperature range of the instrument. A voltage regulator, connected to a specially selected resistance wire, regulates the lamp current with minimal circuitry.

4.2 TROUBLE SHOOTING A MERCURY LAMP TEST FAILURE

The Mercury lamp test fails, and software responds with "**`lamp not on test terminated`**".

1. Check Motor Positions
Retry the test and look through each Viewing Port to see if the lamp turns on. Ensure that the zenith prism and the filter wheels are in the correct position.

2. Check Temperature
Observe the temperature of instrument (TE). If the Brewer temperature is less than 0 degrees Celsius, the lamp may be too cold and may not fire. If this is the case, the Standard Lamp may be turned on for a few minutes to warm the Mercury lamp.

3. Check Lamp Voltage and Current
There is the possibility of a lamp failure. Perform an AP (A/D voltages printout) test. If the Mercury Lamp current is 0.0, and the Mercury Lamp Voltage is near 15 volts, then the lamp is probably bad. Measure the voltage across the lamp, pins 6 and 9 on P111. (Reference Figure 10.6-2.2). It should be approximately 0 volts with the lamp off (B0) and 13 volts with the lamp on (B1).

4. Mercury Lamp Replacement
To replace the bulb, loosen the two thumb screws (item 6, Figure 10.6-2.2) and carefully withdraw the lamp holder. Take care not to touch the new lamp with bare hands. Ensure the lamp is tight in its socket and cleaned with isopropyl alcohol after replacement.
The quartz-halogen lamp should also be checked at this time, as blackening of the glass could reduce the amount of HG light which is passing through it to the foreoptics. Re-assemble the HG lamp by reversing the above steps and test the lamp with B1 and HG commands.

5. Check Micrometer Position
If the lamp is working fine, and light can be seen in the Viewing Ports, then the position of the micrometer should be checked. Remove the “Spectrometer” cover and check to see that the micrometers are in the correct position as indicated in the Final Test Record, and on the Log Sheet taped to the Spectrometer cover. If the Micrometers are not where the Log Sheet indicates, they should be adjusted manually and an HG test attempted again.

6. Attempt a Standard Lamp Test
If the test still fails, the problem could be in a misalignment of a component in the Spectrometer, a problem in the slit mask, or a fault in the PMT or counting circuitry.
Attempt a standard lamp test. The standard lamp has a much higher intensity and does not depend on the position of the micrometer and slitmask as much as the mercury lamp test.
If the standard lamp test operates correctly, the SL printout should be examined carefully to see if any characteristics have changed. If the dark count has increased significantly, this may be an indication that the alignment has changed and may require a mirror adjustment. Check to see if any of the intensities or ratios have changed, which may indicate that the optics have deteriorated, or the PMT performance or counting has degraded. If the standard lamp test results appear to be normal, then KIPP & ZONEN should be contacted before proceeding.

7. Measure High Voltage
If the standard lamp test is not operational, then it can be assumed that there is an optical failure, or a PMT failure. If the mercury lamp test is normal while the standard lamp has failed, this usually indicates a problem with the lamp or the circuitry that controls the lamp.
The high voltage should be measured using a voltmeter and looking at test point E16 on the Main Electronics board. There should be a voltage between 2.5 volts and 5 volts, which has been factory set (see final test record for the setting), and should not be adjusted. This voltage is equal

to the actual high voltage divided by 409. There may be a variation of a volt or two of the high voltage, but the voltage at test point should be very close to the final test record value. If it is significantly different, the high voltage circuit may have failed. This will require a skilled technician for repair or KIPP & ZONEN should be contacted.

8. Check Light Detection System
If the high voltage appears to be normal from the test point reading, then there is a possibility that something has failed in the Light Detection System, reference Section 4.7.

4.3 STANDARD LAMP CIRCUIT

The standard lamp current regulator is similar to the Mercury lamp circuit except the resistance wire is chosen to regulate the supply current with less variation than the mercury lamp. The circuit maintains the operating current within 3 milliamps over a range of -20 to + 40 degrees C, and is even more stable in the operating range of 10 to 30 degrees.

4.4 STANDARD LAMP FAILURE

The quartz-halogen (Standard) lamp is the lamp most frequently used in self diagnostics of the Brewer. With it, calibration can be monitored, and correct operation of many systems can be inferred.
The software for the standard lamp tests has been designed to give an error message in the event of a failure. The message is "Lamp not on test terminated". The message may be somewhat misleading in that there are many conditions which can make it appear that the Lamp is not on. These conditions include PMT performance, filterwheel positioning, Zenith prism position, photon counting electronics, and the I/O electronics used to turn the lamp on and off.

4.5 TROUBLE-SHOOTING STANDARD LAMP TEST FAILURE

Error message, "Lamp not on test terminated".

1. Check if Lamp is Burned Out
Retry the test and if the lamp is on, it will be seen through the viewing ports if the Filter Wheels, iris, and the Zenith Prism have moved into the proper position. Perform an AP (A/D voltages printout) test and compare results with previous tests, paying particular attention to standard lamp current and voltage. The current, channel 14, will be approximately zero and the voltage, channel 15, will exceed 14 volts if the lamp is unplugged or burnt out.

2. Attempt HG Test
If the test continues to fail, a mercury lamp test should be attempted. If the mercury lamp test operates correctly, then the Light Detection System is probably operating correctly. If so, a mercury lamp calibration should be done and the Standard Lamp test should be repeated.

3. Observe Slitmask Performance.
If the mercury lamp test is normal, the spectrometer cover should be removed and another standard lamp test done while observing the slitmask. If the standard lamp fails again while the slitmask is operating correctly, KIPP & ZONEN should be consulted.

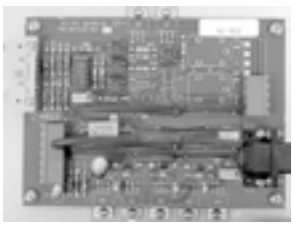
4. Photon Counting Circuitry
If the mercury lamp test is not normal, there is probably a failure in the photon counting circuitry and section 4.9 of this manual should be consulted.

5. Replace Standard Lamp
Before starting disassembly, it should be confirmed that the lamp filament is open circuit by checking with an ohmmeter across pins 1 and 5 of J111 (lamp connector). Reference fig. 10.6.2-2. The Standard Lamp is located above the mercury lamp and is attached to a removable plate. Remove the two screws holding the plate. Replace the bulb with a new one, taking care not to touch it with bare fingers- use a tissue or soft cloth and clean the lamp with isopropyl alcohol after installation. If the bulb is blackened, it should be replaced regardless whether or not it is operational. Replace the connector assembly and test the lamp with the B2 command. Be sure to use B0 to turn the lamp off.
Another standard lamp test should now be tried. If there is no success, there is a possibility of circuit failure on the Lamp Control board, or the Main Electronics board.

6. Check Main Electronics Board
Send the command to turn the Standard Lamp circuit on (B2), and measure the voltage at pin15 of U14 on the Main Electronics Board. The voltage should be +5 volts when the lamp is off and 0 volts when the lamp is on.
If this voltage does not change, the Main Electronics board should be replaced, or KIPP & ZONEN consulted.

7. Check Cable
If there was an indication of a 0 to 5V voltage swing at pin 15 of U14, but still no lamp operation, the cable that connects the Main Electronics board to the Lamp Control board should be checked.

8. Test Lamp Control Board
If the cable it is good , the Lamp Control Board should be tested for correct operation. The lamp control for the standard lamp is very simple - Q1 pin 2 supplies power to the current regulator VR2 (both components are on the bottom edge of the Lamp Control Board). Measure Q1 pin 2, and when the standard lamp is commanded on, it should go to 17 volts. VR2 pin 2 should be 10 volts. If it this point does not go to 10 volts, then the current regulator circuitry is faulty and must be repaired or the complete board must be replaced. Refer to the lamp control board schematic Fig 10.4-2.



9. Test Lamp Cable
If the voltage at VR2 does change on command, then the lamp cable should be tested for continuity.

4.6 LIGHT DETECTION SYSTEM FAILURE

A Light Detection System failure may show up in any or all of the diagnostic or measurement tests of the Brewer. In Lamp diagnostics it will usually be shown on the Computer Display as "Lamp Not On .. test terminated" message. In a measurement (DS for example), the counts may simply go to zero, or some other incorrect number, depending on the nature of the failure. Results of Lamp tests are predictable so an HG and/or SL should be attempted if there is any suspicion of a Light Detection problem.
The Light Detection System is comprised of the foreoptics, spectrometer, micrometers, slit mask, and the PMT (including the high speed amplifier). Adjustments of any of these assemblies should be done with extreme caution, unless they are specified in this manual, as Instrument calibration may be affected.

4.7 TROUBLE-SHOOTING THE LIGHT DETECTION SYSTEM

1. Confirm Motor Positions are Correct
If Lamp tests fail and the message "Lamp not on test terminated" is displayed, the SL command should be issued. With the lamp on, the correct positions of the zenith prism, filterwheels, and iris should be confirmed. The correct positions are printed to the screen when the SL command is issued. Light from the lamp should seen in both view tubes.

2. Test Photon Counting Circuit
If the SL test fails the photon counting circuitry should be tested.
Turn off the power, remove the ribbon cable from the PMT output, and plug it into J22 of the Main Electronics Board. This connector is the output of a 1MHz Pulse Simulator (see picture).
Turn on the Brewer power and from the Main Menu enter the Teletype command, TT. At the teletype prompt, enter the command **R,0,7,20;O**. The display should show 8 numbers, each being approximately 2,280,140 counts. Exit TT by pressing the Home key, turn off Brewer power, replace the PMT cable, and turn power back on.
If the test is normal, the Counting System is operating correctly.
Now check components in the Spectrometer.

3. Check Micrometer Position
In a low light level and dry room, remove the Brewer cover and the Spectrometer cover. Confirm that the micrometers are in the correct positions as indicated on the 'Micrometer Position' log sheet that is taped to the Spectrometer cover.

4. Check Mirror and Grating
Check that the spherical mirrors, the gratings, and the two flat mirrors appear to be in place, and that their mounting assemblies appear normal. ** TAKE CARE NOT TO TOUCH THE SURFACES OF EITHER THE MIRRORS OR THE GRATINGS AS PERMANENT DAMAGE MAY OCCUR **** .

5. Test Slitmask
Slitmask operation can be confirmed by returning to Telytype operation (TT), sending the R,0,7,20 command, and noting that the slitmask moves back and forth pausing briefly at each of the 8 slitmask positions.
Commands R,X,X,20 (where X =0 to 7) can be sent in sequence. After each command a slot in the slit mask should line up with a slot in the slit plate EXCEPT on command R,1,1,20, which is the Dark Count position. If the slitmask does not move, or appears to move incorrectly, then the I/O cable, Motor, or the motor control micro or motor driver IC on the Main Electronics board may be faulty. The Main Electronics board should be replaced and another test attempted.

6.Check Dark Count
If the slitmask appears to be functioning correctly note what the count values are when the command **R,0,7,20;O** is issued in Teletype. There is a very important difference between a count rate of zero and a count rate near zero. A high count rate indicates correct operation. A low count rate indicates that only dark count (a function of the PMT) is being measured and the light coming through the slit mask is not being measured. A zero count rate indicates a problem with the PMT or its electronics.

7. Measure High Voltage Test Point
Replace the Spectrometer cover, and remove the cover from the Main Electronics board.
Measure the high voltage test point E16 on the main electronics board (see picture), if it is not the same as the value given in the Final Test Record, section 5.0, then adjust R4 on the high voltage control board.

8. Check High Voltage Cable
If the test point voltage cannot be achieved, there may be a short circuit in the high voltage line somewhere between the HV module and the actual PMT dynode chain. Care should be taken when inspecting this area because there can be as much as 1800 volts at the connection points. Check the high voltage cable for continuity.

9. Measure High Voltage at PMT
The rear cover of the PMT housing can be removed (turn CCW) and the actual high voltage measured on the internal connector. This measurement must be done with a voltmeter rated for 2000 volts or by using a high voltage probe.
If the high voltage is still not as indicated on the Final Test Records, then contact KIPP & ZONEN.

10. Test High Speed Amp Board
If high voltage is correct, there may be a failure in the high speed amp board. TP1 on the high speed amplifier board (inside the PMT housing) should read -10 millivolts (referenced to the HV connector shield) or the value recorded in the Final Test Record, section 4.0. If the value of this test point is incorrect, an adjustment of the on-board potentiometer can be attempted. If this test fails, replace the high speed amplifier board.
If this test point is normal, the photon counter cable should be inspected to ensure that all connections and wires are in tact. Finally, an oscilloscope can be used to monitor test point TP4 on the high speed amp board, and then pins 1,2,3,4, and 12,13,14, 15 of the IC, SN75114N. There should be clean square waves, the frequency of which should vary with light intensity.

If these signals are normal, consult KIPP & ZONEN before proceeding further. If any of the signals are missing or are not clean square waves, replace this board.

11. Contact KIPP & ZONEN
If all of these tests fail, there is a probable fault in the PMT, and KIPP & ZONEN should be contacted before proceeding.

4.8 STEPPING MOTOR CONTROL

The stepping motor control circuitry provides for the control of each stepping motor through individual motor microprocessors and stepping motor driver integrated circuits. This type of motor control allows the system to move the motors simultaneously, and to monitor the sensors very efficiently. All of the motor microprocessors are controlled by the main processor through a serial "I2C" bus. Each motor is optimized for speed and taylored to each function in the Brewer. The configuration file is included with the control software to allow changes and updates to the system. The configuration file is optimized for each instrument and normally does not require operator modifications unless recommended by KIPP & ZONEN.

4.9 PHOTON COUNTER CIRCUITRY

A schematic diagram of the photon counter circuitry is given in figure 10.4-1. The photomultiplier signal which has been amplified and divided by a line driver on the pulse amplifier board is received by a line receiver on the Main Electronics board. This signal is fed to a pair of binary counters. The outputs of the 2 counters are compared and if they differ by more then a set amount the second counter is disabled and a “PMT counter failure” message is generated in the Firmware Log. The counters are each connected to output ports which are connected to the data bus of the system microprocessor.
The main gate is generated by an electronic circuit that provides a very precise gating signal to enable counting for a specific length of time. The microprocessor decides when the pulse counting circuitry is initiated and the circuitry then triggers the gate to allow counting of the photons.

4.10 HIGH SPEED AMP BOARD

The photomultiplier, and pulse amplifier board are enclosed inside the photomultiplier subassembly. The sub assembly is designed to allow access to the pulse amplifying circuitry without upsetting the alignment of the PMT or the optics.
The photomultiplier is an EMI 9125UVA type. It is enclosed in a magnetic shield at the high voltage potential of the photo cathode. A small area on the shield is open to allow light to fall on the cathode. A high voltage power supply provides stepped voltages to the photomultiplier through a resistor divider circuit at the base of the tube. Since differential thermal expansion between the photomultiplier glass and the teflon base may cause tube breakage under extreme temperature conditions, it is recommended that the photomultiplier housing never be subjected to temperatures of less than -50C or greater than +60C.
The pulse amplifier board is located directly behind the base of the photomultiplier tube. This circuitry accepts the photon pulse signals from the photomultiplier, amplifies them, discriminates the signal level from current leakage, divides the amplified photon pulses by four, and finally outputs the pulse on a line driver. Since the circuitry is extremely sensitive to feedback and RF noise, it is located in close proximity to the photomultiplier.

4.11 RATEMETER

The ratemeter circuit provides a voltage output of the photon count rate. It consists of a two-transistor charge pump on the high speed amp board, and an integrator-amplifier on the Main Electronics board. A transistor is connected as a current pump and driven by one of the outputs of a J-K flip flop on the high speed amplifier board. The pulses from the flip flop are integrated by an RC network then scaled by an op-amp.

4.12 TEMPERATURE MONITOR

The temperature monitor is a temperature sensitive bridge using YSI linearized thermistors. The bridge output is amplified to produce a suitable scale for the A/D converter. There are six thermistor circuits available, one of which is located in a hole drilled in the side of the front flange of the PMT housing. The other five are used to measure temperature at points around the instrument as status information. One of the sensors monitors outside temperature.

4.13 HIGH VOLTAGE CIRCUITS

The high voltage (600-1600 volts) for the photomultiplier (PMT) is provided by a DC-DC converter / high voltage control circuit board.

4.14 CLOCK / CALANDAR

The real time clock/calendar circuit is a battery backed up clock with integral static random access memory. A lithium battery is used to keep the clock operating when there is no power applied to the Brewer. The clock is year 2000 compatible.

4.15 A/D CONVERTER

The A/D converter has a 10-bit conversion resolution and is built into the microprocessor. Analog multiplexers are utilized to select the channel to monitor. The AP routine is the main routine that accesses the data and displays the information on the PC monitor, saves it to a file, or prints it on the printer.

4.16 BREATHER DESICCANT CARTRIDGE

The breather desiccant cartridge allows the Brewer to compensate for normal pressure changes, while preventing the influx of moist air. Note that the breather desiccant does not remove moisture from the Brewer. Extra desiccant is needed to remove moisture from inside the instrument. Breather desiccant is housed in a plastic container with a breathing tube placed at the bottom of the cartridge. The other end of the tube is connected to a port at the bottom on the underside of the Brewer and is exposed to the outside air. As the air is drawn in from the outside, the air is dried as it passes the desiccant. Reference figure 10.8.

4.17 HUMIDITY SENSOR (OPTIONAL)

The humidity sensor is a monolithic IC sensor that provides a voltage output proportional to relative humidity. The sensor is buffered by an Op Amp and the output is connected to one of the analog input channels of the A/D converter. A temperature sensor is located near the humidity sensor to provide temperature compensation for the device. The two measured values, relative humidity and temperature allow the absolute moisture to be calculated. The absolute humidity (grams/m^3) value is displayed on the PC screen along with a numerical “moisture index” value. Refer to Figure 10.4-5 for the sensor specifications and Figure 10.4-6 schematic for the humidity sensor assembly.

5 TEST RESULTS OUT OF SPECIFICATION

Whenever any diagnostic tests are out of specification, (SL, HG,DT,RS,) the following should be done or considered.

1. If the deadtime has increased or decreased significantly, the High Speed Amplifier board may be defective, the slitmask may have become misaligned, or a ground in the instrument wiring may have become resistive. High moisture levels inside the instrument may also cause abnormal deadtime results.

2. A test lamp may have deteriorated to the point where tests are affected, and the lamps may require replacement. They can be inspected as mentioned in the previous sections, and replaced if necessary.

3. The optical surfaces within the zenith prism may have become smudged with a fingerprint or may have become dusty over a period of time. The prism should be cleaned, referring to section 6.2.

4. The micrometer may be "sticking" and not in its exact location after a measurement or a test. It should be inspected and the drive mechanism carefully cleaned with tissue and isopropyl alcohol.

5. Dark count is a convenient characteristic to monitor as it is printed out in many tests and measurements. Dark count changes may be the result of moisture, changes in the slit mask, PMT, high Voltage, or counting circuitry.

6. When the dark count of an instrument changes, or becomes erratic, a slitmask Run-Stop test should be done to see if there are any changes in the slitmask circuitry. If this does not give any indication of the problem, there may be a ground somewhere which has become resistive, and it should be checked.

7. The High voltage test can be done, and the results compared to those in the Final Test Records.

8. Generally speaking PMT problems are not field repairable.

9. Desiccants should be changed at regular intervals. The frequency of desiccant change depends on the climate. Desiccants will require changing much more frequently in humid environments. Alternately the humidity indicator can be used to indicate that desiccant needs changing – desiccant should be changed if the moisture index provided be the electronic humidity sensor is greater then 10 or if the paper indicator for 40% humidity is no longer blue. Desiccants can be removed and dried overnight at approximately 60 degrees C if necessary.

If these checks fail to locate the problem, KIPP & ZONEN should be consulted as to further investigation.

6 OPTICS CARE AND CLEANING

6.1 OPTICS CARE

- Never touch the polished surface of optics.
- Hold an optic only by its edges.
- Reduce the need for cleaning optics as much as possible.

6.2 OPTICS CLEANING

- Use latex gloves when handling or cleaning optics.
- Do not reuse cleaning materials.

SPECTROMETER MIRRORS, ND FILTERS, QUARTZ PRISMS AND LENSES: In the event of dust, blow off with rubber hand pump (avoid using your breath) or use bottled dry nitrogen to remove particles. In the event of grease or fingerprints, dampen a very soft cloth with methyl ethyl alcohol and wipe gently. NOTE: Wipe marks will almost certainly remain. To remove the wipe marks, dampen a soft tissue with a mixture of ether and isopropyl alcohol and wipe gently. The tissue should be dampened to the extent that while wiping, the mixture evaporates one to two millimeters behind the tissue.

QUARTZ DOME AND EXTERIOR QUARTZ WINDOW: Spray with window cleaner and wipe clean with a soft cloth.

LAMPS: Dampen a soft cloth with methyl or ethyl alcohol and wipe gently.

POLARIZING FILTER: Use only a soft, dry cloth or tissue to remove dirt and finger marks. The filter should always be wiped gently to avoid marring the finish.

DIFFRACTION GRATINGS: Do NOT touch or attempt to clean.

7 AZIMUTH TRACKER

Problems in the Azimuth Tracker affect the Brewer's ability to track the sun, and thus any measurement that depends on direct solar radiation may be in jeopardy.
Regardless of the problem, it is usually manifests itself as frequent failures of the Solar Siting test (SI), or the Steps per Revolution test (SR).
The Main Electronics Board sends motion commands to the Tracker, and receives sensor indications from the Tracker via the Azimuth Tracker connector on the front of the Brewer base.
Indirect problems can affect Brewer power and communications since both of these cables pass through the Tracker housing assembly. Communications is routed through a surge suppressor assembly mounted on the bottom of the Tracker, and Power is supplied to the Brewer via the Tracker enclosure wherein a second set of surge suppressors is located.
If the surge suppressors in the communications line are faulty, a no-communications condition can exist. The communication cable from the Computer can be connected to bypass the Tracker as a troubleshooting aid in determining if the surge suppressor assembly is at fault.
Similarly, power can be connected directly to the Power Connector on the Brewer in the event that a "no power" problem exists in the Brewer.
The Power switch on the Tracker will not affect power to the Brewer, but a failure of the fuse in the Tracker will interrupt both Brewer and Tracker power.
Tracker problems can be either mechanical or electrical.

7.1 BREWER POWER PROBLEMS.

Power for the Brewer passes through the Tracker Case where it is connected to a set of MOV surge suppressors. In the event of large transient voltages on the power cable, one or more of these components may become damaged, and subsequently result in AC power short circuits which may affect power to both the Brewer and the Tracker. Connecting the AC power directly to the Brewer and observing if operation is restored is a method of troubleshooting this subassembly. An ohmmeter can then be used to determine the specific component at fault. Power connections in the Tracker, including the Fuse, can also be checked in the event of power problems in the Brewer.

7.2 BEWER COMMUNICATIONS PROBLEMS

A failure in the surge suppressor in the communications link can be checked by connecting the communication cable from the Computer directly into the Brewer. If Brewer/Computer communications are restored, the surge suppressor subassembly is likely at fault.

7.3 TRACKER ELECTRICAL PROBLEMS

Electrical problems include AC power, power supply, motor driver board, stepper motor, and sensor/blocker assembly.

7.3.1 Sensor Problems

The tracker is prevented from travelling past the zero (or North) position by a sensor that is attached to the aluminum drive plate. A blocking device which rotates with the Tracker body cuts a light beam in the sensor and the resulting change in sensor voltage output is detected by the electronics.
If it is observed that there is frequent wrapping of the power and communications cable, or activation of the safety switch, the sensor and its wiring should be tested.

1 With a DC voltmeter, monitor the sensor voltage at U3, pin 13 on the Main Electronics Board.

2 Pass a piece of paper (or other opaque material) through the sensor, and the voltage should go from +5 volts in the blocked state to 0 volts in the non-blocked state.

3 At the Tracker, pin 5 of J201 should go between 0V and 5V as the sensor is unblocked and then blocked.

4 Replace the sensor assembly and cables as necessary.

5 If the above tests shows the sensor and cables are good, then confirm that the blocker passes through the sensor as the Tracked rotates.

6 If all of the tests are good, there could be a problem on the Main Electronics Board sensor detecting circuitry, in which case KIPP & ZONEN should be consulted.

7.3.2 No Tracker Operation.

If the Green Power Indicator indicates no Tracker power, but the Brewer functions normally, a problem in the Tracker is indicated.
The Tracker covers should be removed and the AC power to the Power Supply confirmed. If AC is present then the +5 V output of the power supply should be measured. If no +5V is found, then the Power supply is at fault and should be replaced.
If the Power supply is normal, then the safety switch should be inspected to confirm that it has not been tripped by an over travel condition. The switch should be in the toggle position away from the Tracker centre pedestal.
If the Power Supply and safety switch are both normal, and there is still no motor motion, then it should be confirmed that the Brewer is outputting drive pulses to the Tracker.

1 Tracker movement pulses can be found on the cable going to the Tracker Driver Board BA-C99, connector P201, pin 1. Square pulses, 0-5V in amplitude may be observed with an oscilloscope, or an AC reading indication of 2 Volts can be seen with an AC Voltmeter.

2 Connect an Oscilloscope or Voltmeter to pin 1 of Connector P201 of the Board BA-C99 in the Tracker. (lower left of the BA-C99)

3 From the Brewer Main Menu, go to the TeleType mode.

4 Send the Command M,2,1000 and pulses should be observed.

5 If no pulses are seen at the Tracker, then look on pin 4, J17T on the Main Electronics board. This pin is the 2nd from the left on the top row of solder connections just behind J17T when facing the removable plate of the Main Board.

6 If there are still no pulses, then remove the connector at the BA-C99 end and try again – this will test for a short circuit in the cable

7 If the test fails again, then a fault is indicated in the motor driver circuitry on the Main Electronics Board, and this board should be replaced.

8 If it is confirmed that pulses are going to the Tracker and if the Tracker Power Supply and Safety Switch are both normal, and there is still no motor motion, then the motor Driver board in the Tracker should be replaced.

9 Failure of the motor to move under command at this point indicates a possible motor failure, or a failure of interconnecting cables. All interconnections should be inspected.

7.4 TRACKER MECHANICAL PROBLEMS

If the Tracker stepping motor is observed to rotate, but the Tracker does not turn, or turns erratically, this is an indication of a mechanical problem.
The first check should be for cleanliness of the aluminum drive plate, and particles jamming between drive gears.

A rare mechanical problem is the seizing of the main bearings, which can be checked by turning Tracker power off and attempting to rotate the Tracker by hand. If the Tracker does not turn freely, then KIPP & ZONEN should be consulted.

If the Tracker turns freely with no power, and the motor turns when an AZ or SR command is issued, then a mechanical problem exists between the motor and the main drive plate.
Check the small motor gear and confirm that it is turning with the motor, and is not slipping on the gear with which it is meshing. Also check for slippage between the stainless steel drive rod and the large aluminum drive plate.

If the motor gear does not turn with the motor, then check the set screw which holds the gear to the motor shaft. If the motor gear turns, then the spring tensions that provide drive friction between the gears, the drive shaft, and the drive plate may require adjustment. (Ref Figure 7.1 and Section 5.4 of the Operator's Manual).

A spring scale can be used at the top and bottom of the shaft and the tension adjustments set to 4kg at the top, and 9kg at the bottom tension point.
If the Tracker still does not turn, or gives inconsistent SR results, then KIPP & ZONEN should be contacted for assistance.

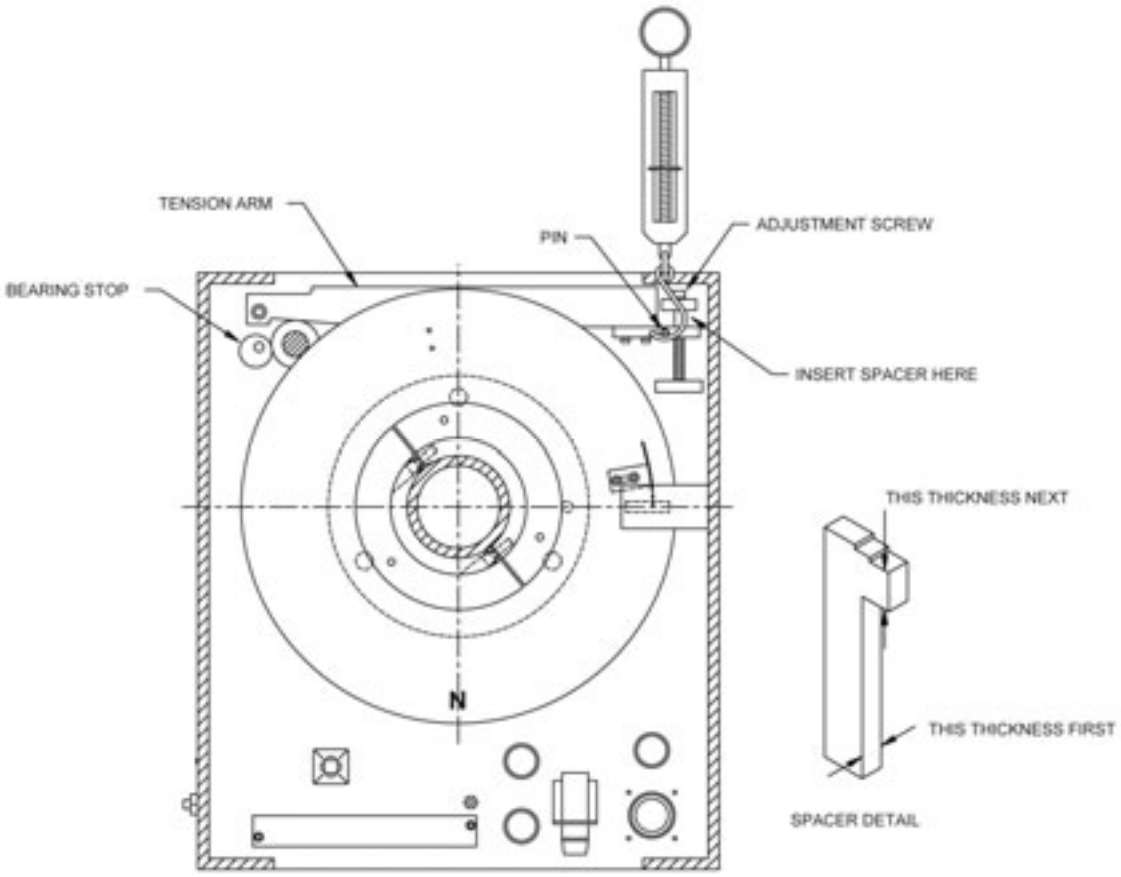


Figure 7.1 Tracker Drive Mechanism

8 MAIN ELECTRONICS FIRMWARE / CONFIGURATION LOADING PROCEDURES

This procedure is used to upload new firmware for the BREWER Electronics or to update the configuration files stored in flash memory. The only time this procedure is required is if the firmware has been corrupted due to electrical surges or the memory had been replaced or if the configuration has changed due to some physical changes to the sensor settings or position stops.

8.1 INSTALLATION OF BREWCMD SOFTWARE

Before using any of the procedures in this section the Brewcmd.exe software must be installed and properly configured.
Exit out of the BREWER operating program to DOS.
Take the supplied configuration disk and put it into the computer used to reconfigure the BREWER.
Copy the files from the floppy disk **`a:\bdata\nnn`** to the **`c:\bdata\nnn`** subdirectory using the command
`copy a:\bdata\nnn\*.* c:\bdata\nnn` ↵
Edit the file c:\bdata\nnn\brewcmd.ini. Ensure that the com port setting indicated matches the comport setting for your Brewer.

8.2 RESTORE BACK TO COSMAC MODE

In certain circumstances where the signal line is placed in a permanent Break signal condition, the BREWER will continually try to reset but eventually it has determined that there is a problem and it will halt trying to reset and go into Loadmode. This fault can happen when the RS422 cable has been incorrectly wired or has shorted together to simulate a break condition. To confirm that the processor is actually in loadmode, remove the weather proof cover of the BREWER and look down into the Main electronics board between the cover plate and the microprocessor board. You should see a flashing LED light and if it is in loadmode, it will be flashing quickly in 1/4 second intervals.
The procedure to restore the system back to the Cosmac mode of operation is as follows:

Change to the directory c:\bdata\nnn by typing the command **`cd\bdata\nnn`** ↵
Run the program Brewcmd.exe by typing **`brewcmd`** ↵ This program is a utility to allow the user to communicate to the BREWER Microprocessor and change operating modes or upload files.
If all the connections are correct, the display will reply that BREWER responded and at what baud rate it is communicating. **`[Using load mode at 9600 baud, on com 1; tracing is off]`**

It is expected that it will be in Loadmode but it could be in Opmode as well.
To return it to its normal operating mode, type **`cosmacmode`** ↵
The instrument will reset itself by resetting all of its motors and the display will display the following with other status information.
`Motors Initializing`.
When the instrument has completed resetting all of the motors, the display will now respond to low level commands.

Exit out of the Brewcmd program by typing **quit** ⏎ and the computer will have returned to the dos prompt.
Run the BREWER operating program and then ensure the time and date is correct.

8.3 NEW CONFIGURATION UPLOAD

If hardware changes have been made such as removing the zenith drive gear or adjusting the micrometer drive sensor mask, then correct values for zero offset and other parameters must be uploaded to the instrument for it to operate correctly. The procedure to upload the new configuration file is listed below:
The configuration file that describes the characteristics of the instrument is named BREWnnn.cfg. The nnn will be the instrument number. This file is an ASCII text file that describes all the technical parameters of this particular instrument. This very same file should be uploaded to any replacement BREWER Main Electronics board following the physical installation of the board. A spare BREWER Main Electronics board will normally be sent with the latest configuration file stored at KIPP & ZONEN. If the customer has changed any parameters in the field, it will not be configured into that board and the customer will have to upload the latest file as described below:

Change to the directory c:\bdata\nnn by typing the command **cd \bdata\nnn**⏎
Run Brewcmd.exe by typing **brewcmd**⏎
[using cosmac mode at 1200 baud, on com 1: tracing is off]should be displayed
Type **loadmode** ⏎ to change modes.
Waiting for the mode change to complete and when complete, the display will display [**using load mode at 1200 baud, on 1: tracing is off]**
Go into Opmode by typing **opmode 9600**⏎
Trying Operating mode at 9600 baud is displayed until the display will display **[using operating mode at 9600 baud; on port 1; tracing is off]**
Send the configuration file to the microprocessor by typing **putcfg brewnnn.cfg** ⏎ (nnn is the instrument number)
Wait approximately one minute to transfer
Type **readlog** ⏎ to clear the log buffer
Type **useconfig** ⏎ motors should now reset
When complete **readlog** ⏎ to see if errors were encountered. Contact KIPP & ZONEN if the log displays a problem.
Type **save** ⏎ a number should appear. This tells you how many configuration writes you have left. If the number is '**1**' then the next time a configuration is sent, the top firmware must be written to Flash memory and the configuration area is cleared to allow another 4 blocks of configuration files.
Go to Load mode by typing **loadmode**⏎
Waiting for mode change to complete and
Trying load mode at 9600 baud is displayed until the display will display **[using load mode at 9600 baud, on com 1: tracing is off]**

Go into Cosmac mode by typing cosmacmode⏎
Reading Cosmac mode reset message
Waiting for mode change to complete
Trying Cosmac mode at 1200 baud
Motors Initializing

These are some of the messages seen while going into the Cosmac mode.
Motors should reset and it is ready to run the BREWER operating program type quit ⏎ to get out of Brewcmd
To run the BREWER operating program type BREWER ⏎

8.4 UPLOADING NEW FIRMWARE AND CONFIGURATION FILES

As KIPP & ZONEN develops new firmware and features, it is now possible for the customer to upgrade the firmware without having to open the cover to the BREWER. The New Electronics has incorporated Flash electrically erasable program memory and the system is capable of being updated from the PC. The procedure below will provide a step by step process to upload the firmware and also upload the configuration file which is erased when the new firmware is loaded. This disk is supplied with the instrument when first delivered or will be sent out to the customer when firmware updates are done.

Copy the new top.bin or topv#r#.bin firmware file received from KIPP & ZONEN to the **`c:\bdata\nnn`** subdirectory.

Change to the directory c:\bdata\nnn by typing the command
`cd\bdata\nnn` ⏎
Run Brewcmd.exe by typing **`brewcmd`** ⏎
Eventually the following statement is displayed:
`[using cosmac mode at 1200 baud, on com 1; tracing is off ]`should be displayed. If the command **`help`** ⏎ is entered, a list of available commands will be displayed.
Type **`loadmode`**⏎ to change modes.
Eventually the following statement is displayed:
`[using loadmode at 1200 baud, on com 1: tracing is off]`
Type **`loadmode 4800`** ⏎
Eventually the following statement is displayed:
`[using loadmode at 4800 baud, on com 1: tracing is off]`
Type **`load top.bin`** or **`topv#r#.bin`** ⏎
(# will depend on the version number of the firmware.)
Wait until this task is completed (this will take a few minutes).
The display will display some messages below:
`Erasing Flash memory`
`Writing file top.bin to flash ……`
The display will show 112 moving dots to show its progress
Turn off the power of the instrument for approximately 10 seconds and turn it back on.
Go into Opmode by typing **`opmode 9600`** ⏎
`Waiting for mode change to complete` is displayed and eventually the fan turns on if the heater option is ordered and the display will eventually display **`[using operating mode at 9600 baud, on com 1: tracing is off ]`**
Type **`readlog`** ⏎ to display any errors encountered.
Send the configuration file to the microprocessor by typing **`putcfg brewnnn.cfg`** ⏎
Wait a 1.5 minutes to transfer
Type **`readlog`** ⏎ to clear the log buffer and see if any errors occurred during the configuration installation.
Type **`useconfig`** ⏎ motors should now initialize.
When complete **`readlog`** ⏎ to confirm everything is ok

Type **save** ⏎ a number should appear. This tell you how many configuration writes you had left when the save command was issued. The number of configuration writes left is one less then the number displayed.
The number is '**4**' should be displayed.

Go to Load mode by typing **loadmode** ⏎
The display will eventually display **[using load mode at 9600 baud, on com 1: tracing is off]**

Go into Cosmac mode by typing **cosmacmode** ⏎
A number of messages will appear and eventually the motors should initialize and it is ready to run the BREWER operating program and display **[using cosmac mode at 1200 baud, on com 1: tracing is off]**

type **quit** ⏎ to get out of Brewcmd

To run the BREWER operating program type **BREWER** ⏎

9 WARRANTY

MANUFACTURER'S GUARANTEE / WARRANTY CERTIFICATE
NEW PRODUCT WARRANTY AND LIMITATION OF LIABILITY

KIPP & ZONEN hereby warrants to its products to be free from defects in material and workmanship for a period of one year from date of purchase.

KIPP & ZONEN's obligation under this warranty is strictly and exclusively limited to repairing or replacing, at KIPP & ZONEN's discretion, any such equipment and / or parts thereof which have failed under normal use and service. Expressly this warranty does not apply to any equipment and / or parts which have been improperly installed, been subject to abuse, neglect and / or accident.

The foregoing warranty is in lieu of any other warranties, expressed or implied, including without limitation, any implied warranty of merchantability or fitness for a particular purpose, and of any other obligations of liabilities whatsoever in any event for payment of any incidental or consequential damages, including, without limitation damages or injury to a person or property.

An authorization must be obtained from KIPP & ZONEN prior to the return of any equipment or parts thereof. Returned material is to be turned to the factory, or other location as may be directed by KIPP & ZONEN, freight prepaid and will be returned freight prepaid. KIPP & ZONEN is not responsible for any transportation, insurance, demurrage, brokerage, duties, or councillor charges, etc.

This warranty is given to the original purchaser and may not be transferred without direct written consent of KIPP & ZONEN.

Should an extended warranty be purchased, then the warranty statements in its entirety is applicable for the entire period of time covered by the extended warranty.

In the absence of another prior agreement, this standard warranty statement will apply.

10 BREWER REFERENCE DOCUMENTATION

Section 10.1 Overall Assembly and External Cables	Figure
- Configuration Control Diagram	10.1-1.1
- BREWER System Drawing BS-C1000	10.1-2.1
- BREWER Assembly BA-C231	10.1-3.1
	10.1-3.2
- Azimuth Tracker Option Kit BA-C91	10.1-4.1
BA-C91	10.1-4.2
BA-C113	10.1-4.3
- UVB Installation Kit BA-C114 / BA-C84	10.1-5.1
- Power Cable (External) BA-W12	10.1-6
- Data Cable (External) BA-W68	10.1-7
- Electronics Spares Kit List BA-C222	10.1-4.7
- Brewer Standard Spares Kit List BA-C112/B	10.1-4.8
- Tracker Stand Tie-Down Kit Installation	10.1-8

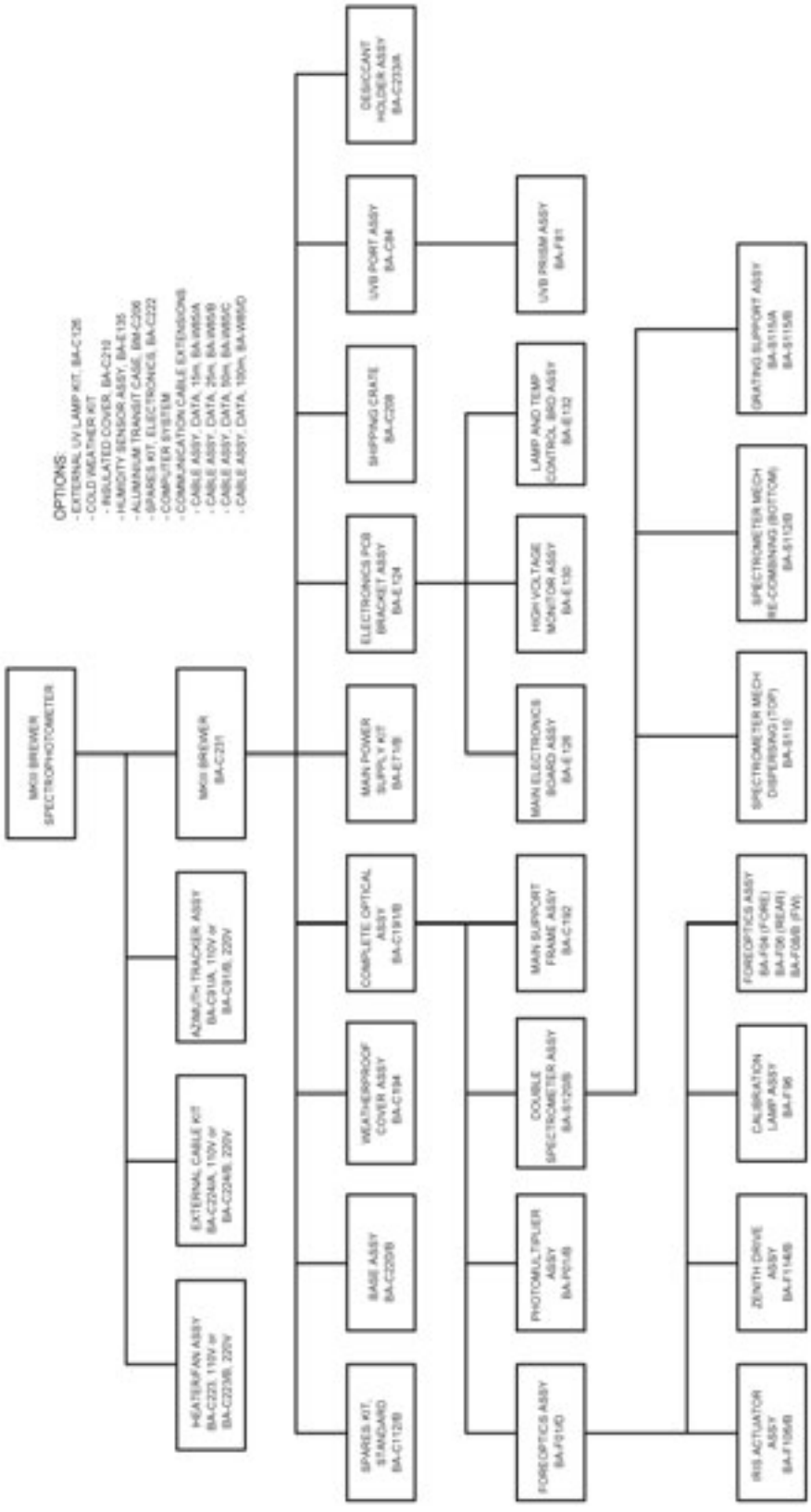
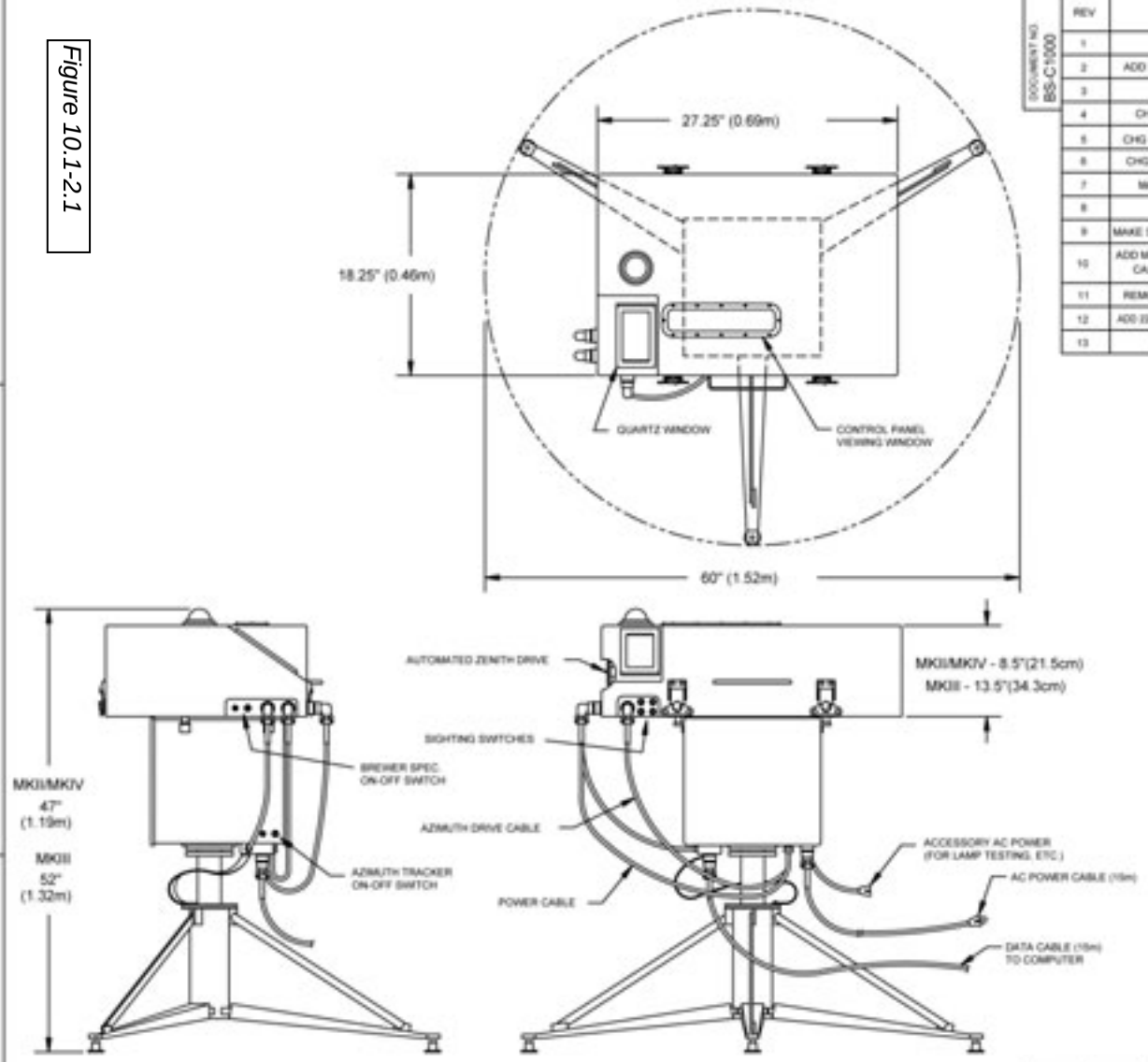

MKIII BREWER SPECTROPHOTOMETER
MKIII BREWER BA-C231
SPARES KIT, STANDARD BA-C1128
HEATER/FAN ASSY BA-C223, 110V or BA-C223B, 220V
EXTERNAL CABLE KIT BA-C224A, 110V or BA-C224B, 220V
AZIMUTH TRACKER ASSY BA-C91A, 110V or BA-C91B, 220V
BASE ASSY BA-C2009
WEATHERPROOF COVER ASSY BA-C194
COMPLETE OPTICAL ASSY BA-C191B
MAIN POWER SUPPLY KIT BA-E118
ELECTRONICS PCB BRACKET ASSY BA-E124
SHIPPING CRATE BA-C209
UVB PORT ASSY BA-C94
DESICCANT HOLDER ASSY BA-C233A
OPTIONS
- EXTERNAL UV LAMP KIT, BA-C126
- COLD WEATHER KIT
- INSULATED COVER, BA-C210
- HUMIDITY SENSOR ASSY, BA-E135
- ALUMINUM TRANSIT CASE, BM-C206
- SPARES KIT, ELECTRONICS, BA-C122
- COMPUTER SYSTEM
- COMMUNICATION CABLE EXTENSIONS
- CABLE ASSY, DATA, 15m, BA-W65A
- CABLE ASSY, DATA, 25m, BA-W65B
- CABLE ASSY, DATA, 50m, BA-W65C
- CABLE ASSY, DATA, 100m, BA-W65D
PHOTOMULTIPLIER ASSY BA-P01B
FORE OPTICS ASSY BA-F01D
DOUBLE SPECTROMETER ASSY BA-S120B
MAIN SUPPORT FRAME ASSY BA-C192
MAIN ELECTRONICS BOARD ASSY BA-E126
HIGH VOLTAGE MONITOR ASSY BA-E130
LAMP AND TEMP CONTROL BRD ASSY BA-E132
UVB PRISM ASSY BA-F91
ZENITH DRIVE ASSY BA-F114B
CALIBRATION LAMP ASSY BA-F96
FORE OPTICS ASSY BA-F04 (FORE) BA-F06 (REAR) BA-F08B (FH)
IRIS ACTUATOR ASSY BA-F105B
SPECTROMETER MECH DISPERSING (TOP) BA-S110
SPECTROMETER MECH RE-COMBINING (BOTTOM) BA-S113B
GRATING SUPPORT ASSY BA-S115A BA-S115B

Figure 10.1-1.1

Figure 10.1-2.1



DOCUMENT NO. BS-C1000

REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
1	FIRST ISSUE		88.9.20	CW	AM
2	ADD UVB EXT LAMP, SHIPPING CRATES	481	90.07.03	FV	KL
3	SEE DCR	487	90.09.12	FV	KL
4	CHG OPTION D. UPDATE SHT 2	530	91.03.19	FV	KL
5	CHG OPTION B FR BA-C83 TO BA-C91	552	92.03.17	FV	KL
6	CHG OPTION H TO ONE STANDARD KIT	581	92.09.03	FV	KL
7	MAKE UVB KIT PART OF OPTION A	618	92.12.03	FV	KL
8	ADD LDDS KIT (BA-C204)	655	93.06.23	FV	KL
9	MAKE STD SPARES KIT PART OF OPTION A	662	94.01.10	FV	KL
10	ADD MKII FW OPTION, MKIII INFO.(TRANSIT CASE, MANUALS KIT, OUTSIDE DIMS)	677	94.04.12	DM	DS
11	REMOVE AZ TRACKER SHIPPING CRATES	712	94.09.01	FV	DS
12	ADD 220V VERSION OF LDDS (BA-C204B)	749	95.08.11	FV	DJS
13	REMOVE ALL OPTIONS REF	868	99.08.09	MSB	TKLL

NOTES:

1. DIMENSIONS SHOWN FOR REFERENCE PURPOSES ONLY.
2. ALL NECESSARY DOCUMENTATION, SOFTWARE AND MANUALS INCLUDED WITH BREWER SPECTROPHOTOMETER.

COMPUTER GENERATED DRAWING
FILENAME: BS-C1000.DWG

SCALE		NEXT ASSY	
DATE	88.08.05	DIMENSIONS IN	
DWN	CW	IF DUAL DIMS	
CHKD	RKF	Tolerances (unless otherwise specified)	
APPD	AM	INCHES	MM
FINISH		.xx ± .020 .x ± .01 ANGLES ± 1° FRACTIONS ± 1/32	.xx ± 0.13 .x ± 0.25 ANGLES ± 1°

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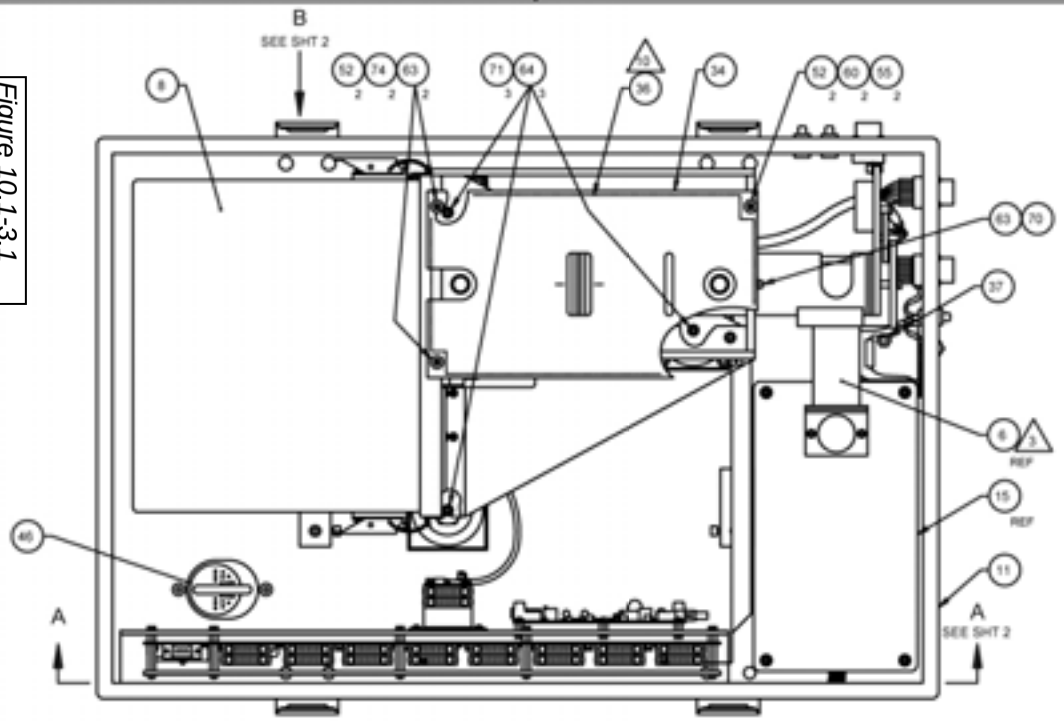
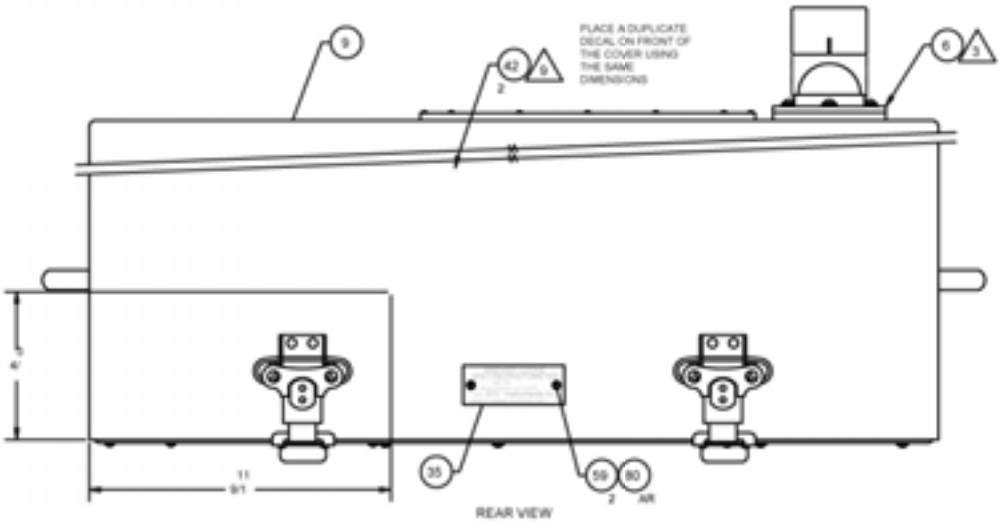
TITLE: BREWER SYSTEMS

SIZE	SHEET	DOCUMENT NUMBER	REV
C	1 of 1	BS-C1000	13

Figure 10.1-3.1



TOP VIEW SHOWN WITH COVER (ITEM 9) REMOVED



REAR VIEW

DOCUMENT NO. BA-C231	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	-	NEW BREWER ELECTRONICS	822	99.04.06	MSB	TKLL
	A	ADD SHIPPING CRATE AND FOAM	858	99.06.17	MSB	TKLL
	B	NEW PART NO. FOR DESICCANT ASSY	900	00.05.11	RKF	BW
	C	NEW BREWER DECAL AND LAYOUT	922	01.01.15	BW	BW

NOTES:

1. REFER TO DWG BA-E71/B FOR ASSY DETAILS OF MAIN POWER SUPPLY (ITEM 15).
2. WIRING HARNESS AND CABLES, ITEMS 24-28, 30 AND 31 NOT SHOWN FOR CLARITY. CHECK TABLE BELOW FOR CONNECTION LOCATIONS.
3. INSTALL UVB KIT (ITEM 6) AS PER INSTALLATION DWG BA-C114 (PART OF ITEM 6). AFTER INSTALLATION PLACE BM-C28 IN BOX WITH UVB.
4. THERMISTOR ASSEMBLY(ITEM 29) LOCATIONS FOR SENSORS.
   - SENSOR #1 - PMT HOUSING ASSEMBLY
   - SENSOR #2 - FAN ASSEMBLY
   - SENSOR #3 - BASEPLATE
   - SENSOR #4 - REAR OF SPECTROMETER ASSEMBLY
   - SENSOR #5 - FRONT WINDOW
   - SENSOR #6 - OUTSIDE EXTERNAL
5. TEST BA-C231 (MKII ASSY) AS PER ITEM 3, BREWER MKII INITIAL TEST PROCEDURE.
6. REFER TO OPTICAL AND ELECTRICAL CALIBRATION AND FINAL TEST RECORD AM-BA-C05 (ITEM 1).
7. AFTER FINAL TEST, SECURE SENSOR IN POSITION USING RTV (ITEM 81)
8. USE CABLE TIE MOUNTS AND CABLE TIES, ITEMS 85 AND 86 AS REQUIRED.
9. AFTER FINAL TEST, PREPARE TO APPLY DECALS. CLEAN THE DESIGNATED AREAS WITH AN APPROVED SURFACE CLEANER. ENSURE ALL BUBBLES ARE REMOVED.
   - ADHERE LOGOS DECALS (ITEM 42) AT POSITION SHOWN. TYPICAL ON OPPOSITE SIDE OF LID.
   - ADHERE LETTERING DECALS (ITEM 43) AT POSITIONS SHOWN.
   - ALL DECALS ARE DIMENSIONED FROM THE COVER'S OUTER SURFACES OR BOTTOM EDGE.
10. PRIOR TO SHIPPING, PLACE FOAM (ITEM 38) ON TOP OF CONTROL PANEL.
11. BAG ITEMS 1, 4, 5, 7, 16, 17 AND 22 AND PACK WITH BREWER USING SHIPPING CRATE (ITEM 10) AND FOAM (ITEMS 38 AND 39).

MOTOR CONNECTION	MOTOR NO.	CONNECTOR	ITEM NO.
ZENITH	1	J13B	24
AZIMUTH	2	J17B	24
IRIS	3	J13T	25
FILTERWHEEL #1	4	J14T	25
FILTERWHEEL #2	5	J14B	25
MICROMETER #2	9	J15T	24
MICROMETER #1	10	J15B	24
SLITMASK	11	J17T	25
AZ SWITCHES	-	J12T	24
LAMP BOARD	-	J2T	26
HV BOARD	-	J2B	27
HV	-	PMT	28,62,72
DC MAIN/LAMP	-	J1-LAMP BOARD J1-MAIN ELECT BRD	30
LAMP	-	J3-LAMP BOARD	31

QTY / REF	UM	PART NO.	MFRs NO.	DESCRIPTION	REMARKS	ITEM

DRAWN	MSB
CHKD	RKF
APPD	TKLL
DATE	98.12.18
NEXT ASSY	
DIMENSIONS IN	INCHES
IF DUAL DIMS	mm (inches)
Tolerances	unless otherwise specified
	INCHES / MM
FINISH	

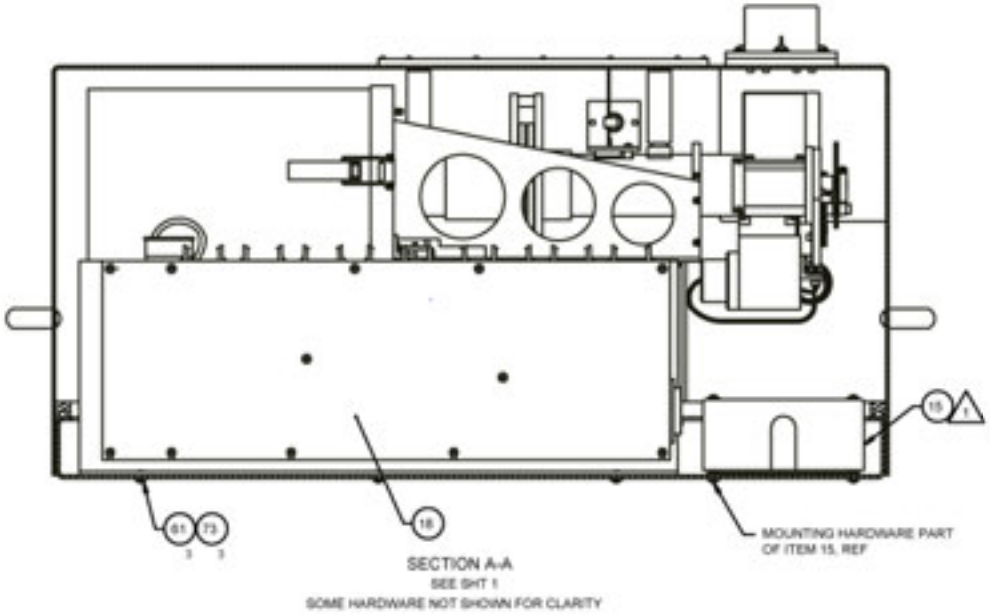
SCHTEC INSTRUMENTS INC.

TITLE: SPECTROPHOTOMETER ASSY, MKII

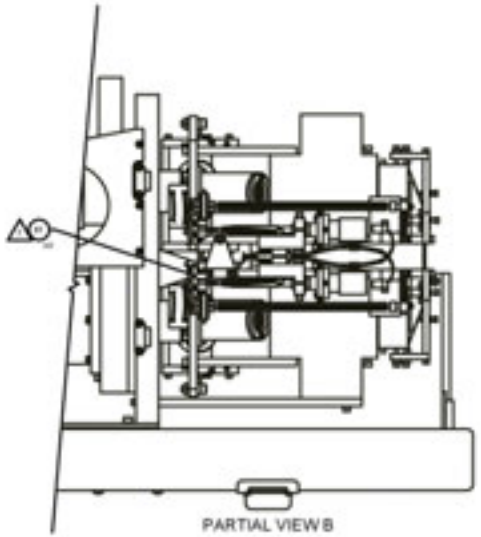
SIZE	SHEET	DOCUMENT NUMBER	REV
B	1 - 2	BA-C231	C

COMPUTER GENERATED DRAWING
FILENAME: BA-C231A.DWG

Figure 10.1-3.2



SECTION A-A
SEE SHT 1
SOME HARDWARE NOT SHOWN FOR CLARITY



PARTIAL VIEW B
SEE SHT 1
SOME HARDWARE NOT SHOWN FOR CLARITY

DOCUMENT NO BA-C231	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	-	NEW BREWER ELECTRONICS	822	89.04.06	MSB	TKLL
	A	ADD SHIPPING CRATE AND FOAM	858	89.06.17	MSB	TKLL
	B	NEW PART NO. FOR DESICCANT ASSY	900	90.05.11	RKF	SW
	C	NEW BREWER DECAL AND LAYOUT	922	01.01.15	BW	BW

QTY	U/M	PART NO.	MFR'S NO.	DESCRIPTION	REMARKS	ITEM

SCI-TEC INSTRUMENTS, INC.

SPECTROPHOTOMETER ASSY, MKIII

SIZE B | SHEET 2 of 2 | BA-C231 | REV C

COMPUTER GENERATED DRAWING
FILENAME: BA-C231(0.DWG

Item no.	BA-C231 Part No.	BREWER MKIII DBL SPECTR Description	Qty.
1	AM-BA-C05	BREWER FINAL TEST RECORD	--
3	IT-BA-C231	BREWER MKIII INITIAL TEST	--
4	MM-BA-C231	SPECTROPH MAINT MAN, MKIII	1.00
5	OM-BA-C231	SPECTROPH OPER MAN, MKIII	1.00
6	BA-C84	OPTION C KIT, UVB	1.00
7	BA-C112/B	SPARES KIT, STD, NEW ELECT	1.00
8	BA-C191/B	COMPL OPT ASSY, MKIII, DOUBLE	1.00
9	BA-C194	WEATHERPROOF COVER ASSY	1.00
10	BA-C208	MKIII SHIPPING CRATE	1.00
11	BA-C220/B	BASE ASSY, MKIII	1.00
15	BA-E71/B	MAIN POWER SUPPLY KIT,W/O DESIC	1.00
16	BA-E116	BREWER OPERATING S/W	1.00
17	BA-E118	BREWER UTILITIES S/W	1.00
18	BA-E124	ELECTRONIC PCB BRKT ASSY	1.00
22	BA-UO7	F/W MAIN BRD, DOWNLOADABLE	1.00
24	BA-W76/A	CABLE ASSY,MAIN TO MTR, 29	5.00
25	BA-W76/B	CABLE ASSY,MAIN TO MTR, 27	4.00
26	BA-W77/A	CABLE ASSY,MAIN TO LMP, 11	1.00
27	BA-W77/B	CABLE ASSY,MAIN TO HV, 16	1.00
28	BA-W78	CABLE ASSY,HV BRD TO PMT	1.00
29	BA-W79	CABLE ASSY,THERM TEMP PROBE	1.00
30	BA-W82	CABLE ASSY, DC, MAIN/LAMP	1.00
31	BA-W83	CABLE ASSY, LAMP	1.00
34	BM-C82	CONTROL PANEL	1.00
35	BM-C105	NAMEPLATE,ALTERED	1.00
36	BM-C202	SHIPPING FOAM,CNTRL PANEL	1.00
37	BM-C218	MODF'D SCREW,EXT TMP SNSR	1.00
38	BM-C162	FOAM, HIGH DENSITY, 27X19X4	2.00
39	BM-C211	FOAM HIGH DENSITY, 27X25X4	4.00
42	12103081	DECAL, SCI-TEC LOGO	1.00
46	12501365-2	DESICCANT HOLDER ASSY	1.00
48	81-90-620	LOCK, CONN SLIDE POST	2.00
49	81-90-630	LOCK, CONN SL RET (15)	1.00
52	83-30-450	BUMPER RUBBR 1/8 HOLE, 3/	4.00
55	83-40-485	NUT 4-40 SL RG HX THIN SS	2.00
59	83-51-752	SCREW 2-56 X 1/4 BUTTON HD	2.00
60	83-51-762	SCREW 4-40 X 5/16 BUTTON H	2.00
61	83-51-804	SCREW,8-32 X 1/2 BUTTON H	3.00
62	83-79-048	SCREW 4-40X5/16 SKT HD	2.00
63	83-79-049	SCREW 4-40 X 3/8 HSC SS	5.00
64	83-79-152	SCREW 1/4-28 X 1/2 HSC SS	3.00
70	83-95-008	WASHER #4 FLAT NYLON	1.00
71	83-95-609	WASHER, 1/4 LOCK INT TH S	3.00
72	83-95-748	WASHER #4, SPLIT LOCKS	2.00
73	83-95-786	WASHER, #8 SCREW 3/8 OD X	3.00
74	83-95-604	WASHER #4 LOCK INT TH SS	2.00
80	85-10-145	ADHESIVE, SEALANT LOCTITE	0.50
81	85-10-150	ADHESIVE, SEALANT RTV	0.50
85	85-80-440	CABLE-TIE MOUNT, 3/4"SQ	3.00
86	85-80-450	CABLE-TIE 4-1/8X.1 NYL 18	6.00

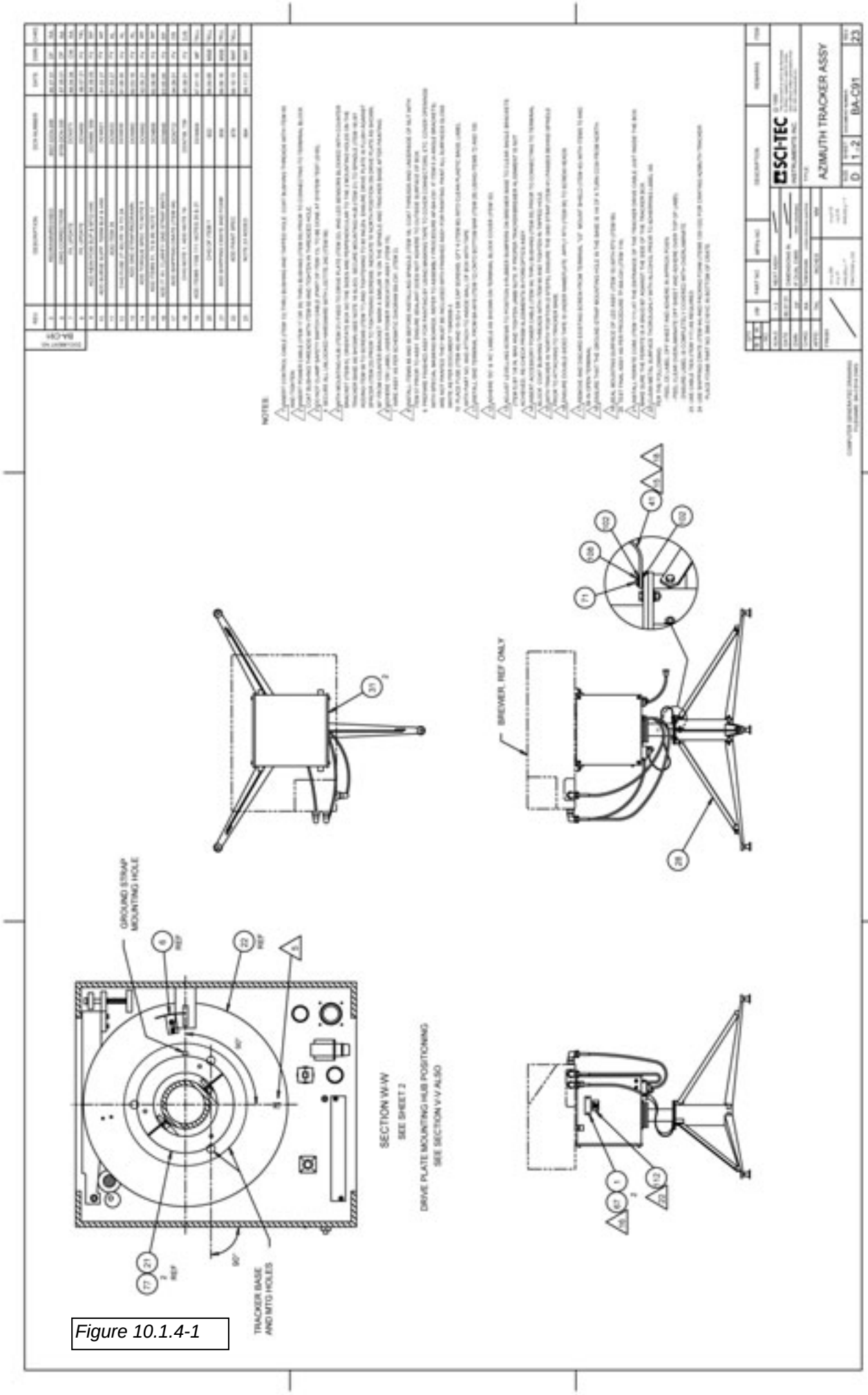


Figure 10.1.4-1

DOCUMENT NO. BA-C91

REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
5	REDRAWN/REVISED	8507-DCN-256	85.07.01	DF	RA
6	DWG CORRECTIONS	8705-DCN-335	87.05.01	DF	RA
7	P/L UPDATE	DCN073	88.04.08	CW	RA
8	P/L UPDATE	DCN459	89.07.21	FV	TKL
9	ADD NEW POW SUP & MTG HW	DCN489, 509	90.09.05	FV	RP
10	ADD SURGE SUPP, TERM BLK & HW	DCN521	91.02.27	FV	RP
11	ADD ITEM 39	DCN533	91.03.27	FV	KL
12	CHG FUSE (IT 40) FR 1A TO 2A	DCN535	91.08.30	FV	KL
13	ADD GND STRAP/REDRAWN	DCN562	92.03.19	FV	KL
14	ADD TORQUE SPEC TO NOTE 5	DCN592	92.05.21	FV	RP
15	ADD ITEMS 51, 70 & 99; NOTE 17	DCN609	92.08.06	FV	RP
16	ADD IT. 61, CLARIFY GND STRAP MNTG	DCN648	93.05.04	FV	RP
17	ADD SHIPPING CRATE (ITEM 44)	DCN712	94.09.01	FV	DS
18	CHG NOTE 1, ADD NOTE 19	DCN738, 739	95.08.01	FV	DJS
19	ADD ITEMS 110& 111; NOTES 20 & 21	DCN804	97.01.15	MF	TKLL
20	CHG OF ITEM 7	822	99.04.06	MSB	TKLL
21	ADD SHIPPING CRATE AND FOAM	858	99.06.16	MSB	TKLL
22	ADD PAINT SPEC	879	99.10.13	RKF	TKLL
23	NOTE 23 ADDED	884	99.11.01	RKF	

NOTES:

1. INSERT CONTROL CABLE (ITEM 12) THRU BUSHING AND TAPPED HOLE. COAT BUSHING THREADS WITH ITEM 60 AND TIGHTEN.
2. INSERT POWER CABLE (ITEM 17 OR 35) THRU BUSHING (ITEM 55) PRIOR TO CONNECTING TO TERMINAL BLOCK. COAT BUSHING THREADS WITH ITEM 60 AND TIGHTEN IN THREADED HOLE.
3. DO NOT CLAMP SAFETY SWITCH CABLE (PART OF ITEM 13). TO BE DONE AT SYSTEM TEST LEVEL.
4. SECURE ALL UNLOCKED HARDWARE WITH LOCTITE 242 (ITEM 58).
5. WITH MOUNTING HUB (ITEM 21) FIXED TO DRIVE PLATE (ITEM 22), AND LED SENSORS BLOCKED WITH COUNTER BRACKET (ITEM 6), ORIENTATE BOX SO THE SIDES ARE PERPENDICULAR TO THE 2 MOUNTING HOLES ON THE TRACKER BASE AS SHOWN (SEE NOTE 18 ALSO). SECURE MOUNTING HUB (ITEM 21) TO SPINDLE (ITEM 18) BY ADDING ITEM 58 TO SCREWS (ITEM 77) AND TIGHTENING TO 80 IN/LB's. ENSURE DRIVE PLATE IS FLUSH AGAINST SPACER (ITEM 23) PRIOR TO TIGHTENING SCREWS. INDICATE 'N' NORTH POSITION ON DRIVE PLATE AS SHOWN, 90° FROM COUNTER BRACKET. MARK A SIMILAR 'N' ON THE SPINDLE AND TRACKER BASE AFTER PAINTING.
6. ADHERE 'ON' LABEL UNDER POWER INDICATOR ASSY (ITEM 15).
7. WIRE ASSY AS PER SCHEMATIC DIAGRAM BS-C91, (ITEM 2).
8. INSTALL ITEMS 88 AND 90 BEFORE INSTALLING SPINDLE (ITEM 18). COAT THREADS AND UNDERSIDE OF NUT WITH ITEM 57 PRIOR TO ASSY. ENSURE SEALANT DOES NOT ADHERE TO OUTSIDE SURFACE OF BOX.
9. PREPARE FINISHED ASSY FOR PAINTING BY USING MASKING TAPE TO COVER CONNECTORS, ETC. COVER OPENINGS WITH SPECIAL MASKING BOARDS. REFER TO ASSEMBLY PROCEDURE AP-BA-C91. IF ITEM 5 (4 ANGLE BRACKETS) ARE NOT PAINTED THEY MUST BE INCLUDED WITH FINISHED ASSY FOR PAINTING. PAINT ALL SURFACES GLOSS WHITE AS PER DOCUMENT 11840008-3.
10. PLACE FUSE (ITEM 40) AND 10-32 x 5/8 CAP SCREWS, QTY 4 (ITEM 80) INTO CLEAN PLASTIC BAGS, LABEL WITH PART NO. AND ATTACH TO INSIDE WALL OF BOX WITH TAPE.
11. INSTALL GND TERMINAL FROM BA-W19 (ITEM 12) ONTO BOTTOM BAR (ITEM 26) USING ITEMS 72 AND 100.
12. ADHERE 'DC' & 'AC' LABELS AS SHOWN ON TERMINAL BLOCK COVER (ITEM 32).
13. ADJUST LEVELLING SCREWS TO POSITION 4 RUBBER BUMPERS ON BREWER BASE TO CLEAR ANGLE BRACKETS (ITEM 5) BY 1/8 IN. MAX AND TIGHTEN JAMB NUTS. IF PROPER TRACKER/BREWER ALIGNMENT IS NOT ACHIEVED, RE-CHECK PRISM ALIGNMENTS IN FORE/OPTICS ASSY.
14. INSERT ACCESSORY POWER CABLE (ITEM 34) THRU BUSHING (ITEM 55) PRIOR TO CONNECTING TO TERMINAL BLOCK. COAT BUSHING THREADS WITH ITEM 60 AND TIGHTEN IN TAPPED HOLE.
15. WITH TRACKER IN 'NORTH' POSITION (0 STEPS), ENSURE THE GND STRAP (ITEM 41) PASSES BEHIND SPINDLE PRIOR TO ATTACHING TO TRACKER BASE.
16. ENSURE DOUBLE-SIDED TAPE IS UNDER NAMEPLATE. APPLY RTV (ITEM 56) TO SCREW HEADS.
17. REMOVE AND DISCARD EXISTING SCREW FROM TERMINAL "V2". MOUNT SHIELD (ITEM 43) WITH ITEMS 70 AND 99 IN OPEN TERMINAL.
18. ENSURE THAT THE GROUND STRAP MOUNTING HOLE IN THE BASE IS 1/4 OF A TURN CCW FROM NORTH.
19. SEAL MOUNTING SURFACE OF LED ASSY (ITEM 15) WITH RTV (ITEM 56).
20. TEST FINAL ASSY AS PER PROCEDURE TP-BA-C91 (ITEM 114).
21. INSTALL FERRITE CORE (ITEM 111) AT THE ENTRANCE OF THE TRACKER DRIVE CABLE JUST INSIDE THE BOX. MAKE SURE THE FERRITE IS A SNUG 90° AGAINST THE SIDE OF THE TRACKER BOX.
22. CLEAN METAL SURFACE THOROUGHLY WITH ALCOHOL PRIOR TO ADHERRING LABEL AS PER THE FOLLOWING:
    - PEEL CE LABEL OFF SHEET AND ADHERE IN APPROX POSN
    - PEEL CLEAR OVERLAMINATE OFF SHEET AND ADHERE OVER TOP OF LABEL
    - ENSURE LABEL IS COMPLETELY COVERED WITH OVERLAMINATE
23. USE CABLE TIES (ITEM 117) AS REQUIRED.
24. USE SHIPPING CRATE (ITEM 44) AND PACKING FOAM (ITEMS 120-122) FOR CRATING AZIMUTH TRACKER. PLACE FOAM, PART NO. BM-C161/C IN BOTTOM OF CRATE.

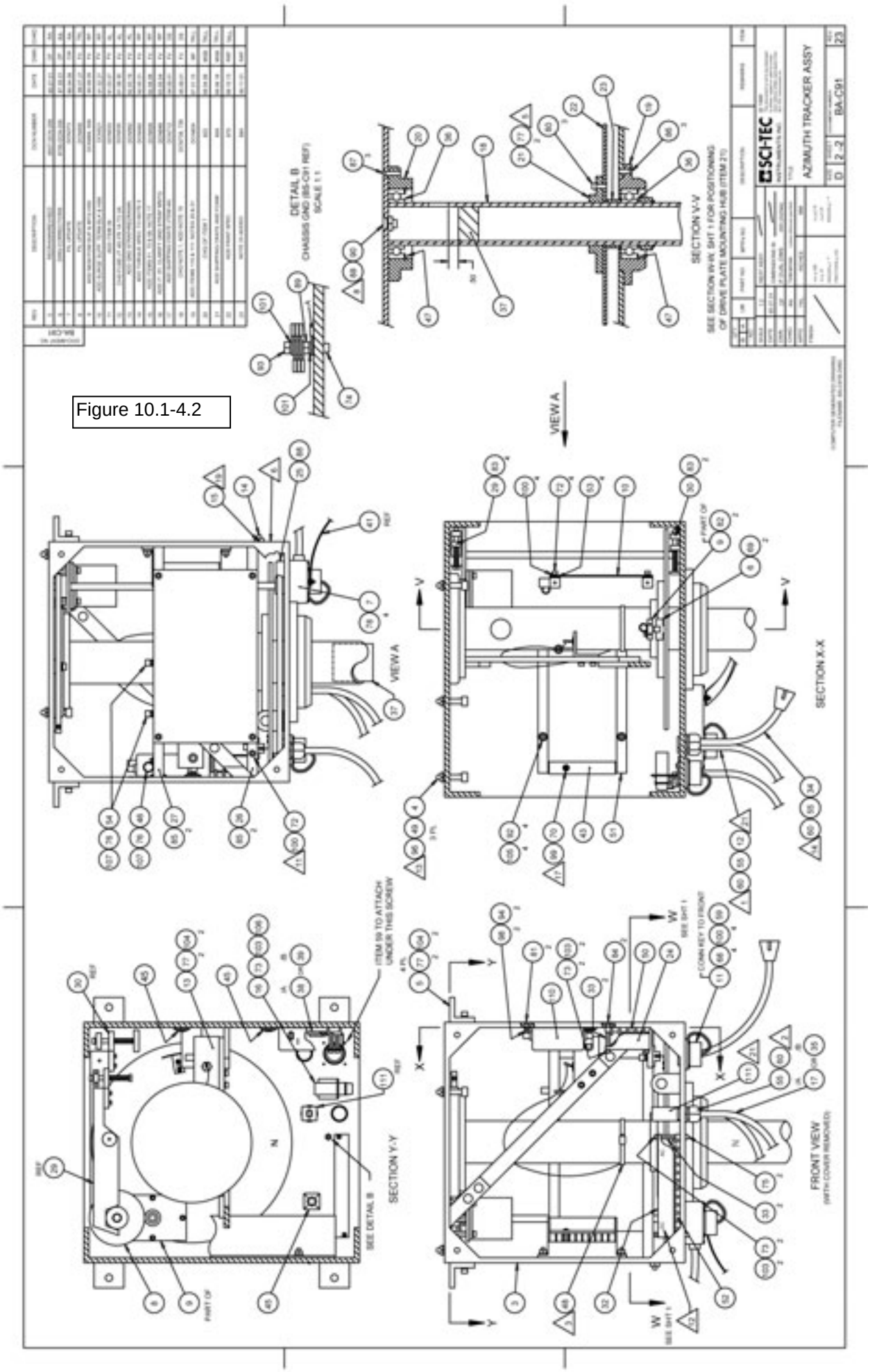


Figure 10.1-4.2

DOCUMENT NO. BA-C91

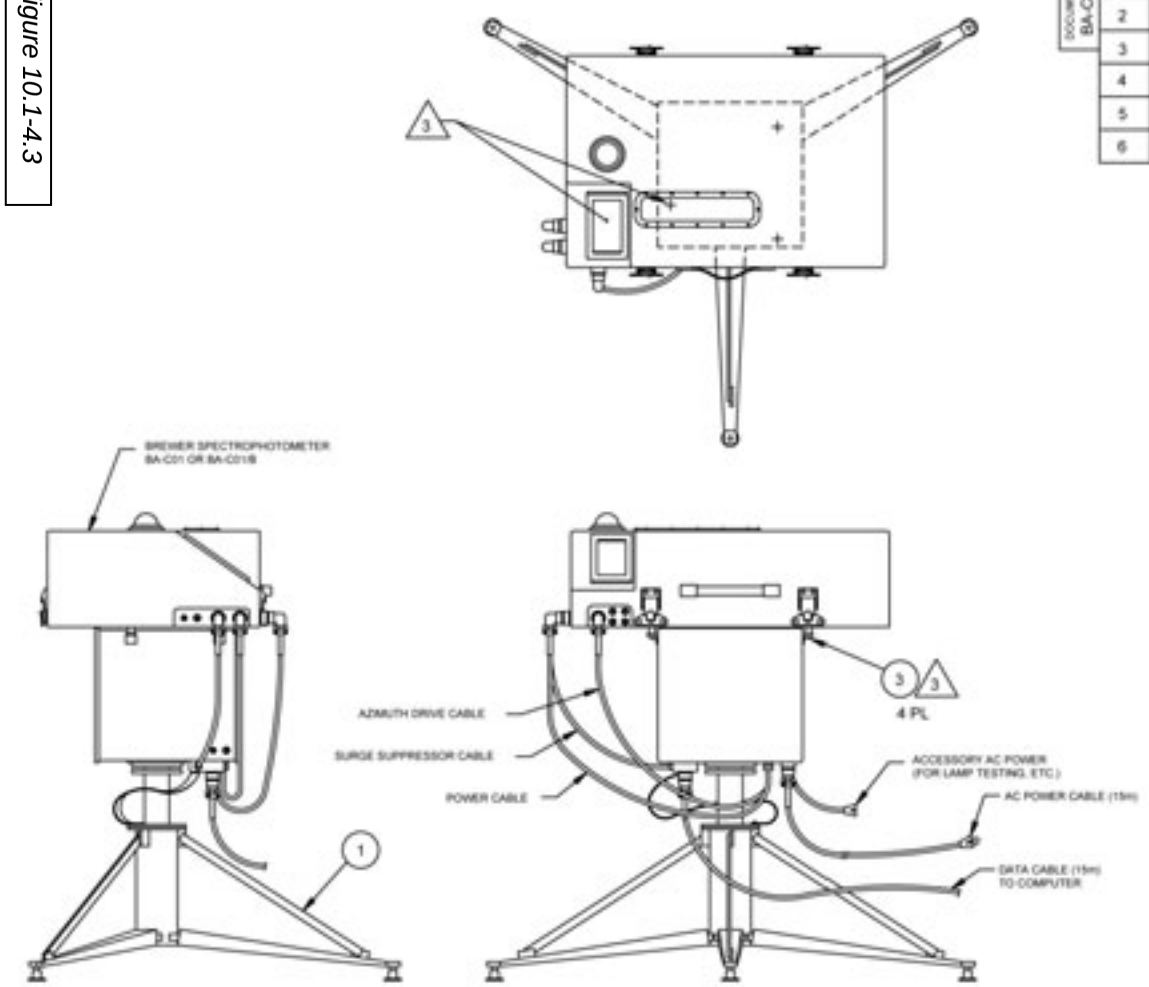
REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
5	REDRAWN/REVISED	8507-DCN-256	85.07.01	DF	RA
6	DWG CORRECTIONS	8706-DCN-335	87.05.01	DF	RA
7	P/L UPDATE	DCN373	88.04.08	CW	RA
8	P/L UPDATE	DCN459	89.07.21	FV	TKL
9	ADD NEW POW SUP & MTG HW	DCN489, 509	90.09.05	FV	RP
10	ADD SURGE SUPP, TERM BLK & HW	DCN521	91.02.27	FV	RP
11	ADD ITEM 39	DCN533	91.03.27	FV	KL
12	CHG FUSE (IT 40) FR 1A TO 2A	DCN535	91.08.30	FV	KL
13	ADD GND STRAP/REDRAWN	DCN562	92.03.19	FV	KL
14	ADD TORQUE SPEC TO NOTE 6	DCN592	92.05.21	FV	RP
15	ADD ITEMS 51, 70 & 99; NOTE 17	DCN609	92.08.06	FV	RP
16	ADD IT. 61; CLARIFY GND STRAP MNTG	DCN648	93.05.04	FV	RP
17	ADD SHIPPING CRATE (ITEM 44)	DCN712	94.09.01	FV	DS
18	CHG NOTE 1, ADD NOTE 19	DCN738, 739	95.08.01	FV	DS
19	ADD ITEMS 110 & 111; NOTES 20 & 21	DCN804	97.01.15	MF	TKLL
20	CHG OF ITEM 7	822	99.04.06	MSB	TKLL
21	ADD SHIPPING CRATE AND FOAM	858	99.06.16	MSB	TKLL
22	ADD PAINT SPEC	879	99.10.13	RKF	TKLL
23	NOTE 23 ADDED	884	99.11.01	RKF	

BA-C91

Item No.	Part Number	Description	120V Qty	230V Qty
1	BM-C100	Nameplate, Altered, Azimuth Tracker	1.00	1.00
2	BS-C91	Azimuth Tracker Unit Schematic	--	--
3	BM-C92	Azimuth Tracker Box	1.00	1.00
4	BM-C93	Adjusting Screw	3.00	3.00
5	BM-C94	Angle Bracket	4.00	4.00
6	BM-C95	Counter Bracket	1.00	1.00
7	BA-W67	Surge Supp Enc Assy, RS422	1.00	1.00
8	BA-C97	Drive Shaft Assy Az/Cosmos Tracker	1.00	1.00
9	BA-C98	Drive Motor Assy	1.00	1.00
10	BA-C99	Azimuth Tracker Brd Assy	1.00	1.00
11	BA-W18	Power Connector Assy	1.00	1.00
12	BA-W19	Control Cable Assy	1.00	1.00
13	BA-W21	Safety Switch Assy	1.00	1.00
14	BA-W22	Power Switch Assy	1.00	1.00
15	BA-W23	Power Indicator Assy	1.00	1.00
16	BA-W24	Fuse Holder Assy	1.00	1.00
17	BA-W30/A	Power Cable, Azimuth Tracker, 110V	1.00	--
18	D2-1030-002	Azimuth Spindle	1.00	1.00
19	C2-1030-005	Bearing Housing, External	1.00	1.00
20	C2-1030-006	Bearing Housing, Internal	1.00	1.00
21	B2-1030-007/A	Plate Mounting Hub	1.00	1.00
22	C2-1030-008	Drive Plate	1.00	1.00
23	B2-1030-015	Spacer Ring, Short	1.00	1.00
24	BM-C88/B	AC Power Shield, 2.25 Long	1.00	1.00
25	A2-1030-019	Drive Bearing Stop	1.00	1.00
26	B2-1030-028	Bottom Bar, PCB	1.00	1.00
27	B2-1030-029	Top Bar, PCB	1.00	1.00
28	D1-1030-045	Tracker Stand Assy	1.00	1.00
29	C1-1030-080/A	Short Tension Arm Assy, Azimuth Drive	1.00	1.00
30	C1-1030-081/A	Long Tension Arm Assy, Azimuth Drive	1.00	1.00
31	C1-1030-084	Cover Assy	2.00	2.00
32	BM-C88	AC Power Shield, 5.25 Long	1.00	1.00
33	83-09-220	Spacer, Hex, 6-32 x 3/4" Lg	4.00	4.00
34	BA-W58	Accessory Power Cable Assy	1.00	1.00
35	BA-W30/B	Power Cable, Azimuth Tracker, 220V	--	1.00
36	B2-1030-101	Bearing, Altered	2.00	2.00
37	BM-C225	Foam Disc Insert	1.00	1.00
38	BA-C166	AZ Tracker MOV Assy, 110V	1.00	--
39	BA-C166/B	AZ Tracker MOV Assy, 220V	--	1.00
40	91-15-257	Fuse, 2A, 250V, Slow-Blow	1.00	1.00
41	BM-C174	Azimuth Tracker Ground Strap	1.00	1.00
42	BA-C113	Option 'B' Kit Installation	--	--
43	BM-C188	Terminal Shield, Azimuth Tracker P/S	1.00	1.00
44	BA-C150	Azimuth Tracker Shipping Crate	1.00	1.00
45	85-80-440	Mount, Cable-Tie, Adhesive Back	3.00	3.00
46	82-20-383	Clamp, 'P', 1/2" x 1/2" x #10	1.00	1.00
47	88-99-780	Retaining Ring, Internal, Spiral Snap	2.00	2.00
48	76-99-445	Hose Clamp, 2-1/2" OD	1.00	1.00
49	83-10-651	O-Ring, 3/8"ID x 9/16"OD x 3/32"Thk	3.00	3.00
50	82-10-470	Terminal Strip, 4 Contact	1.00	1.00
51	87-50-088	Power Supply, Switching, 5VDC, 10A	1.00	1.00
52	82-10-450	Terminal Strip, 12 Contact	1.00	1.00
53	83-09-413	Spacer, 1/4"OD x 1/8"ID x 1/8"LG, AL	4.00	4.00
54	82-20-356	Clamp, 'P', 1/4" x 1/2" x 13/32"	2.00	2.00
55	83-08-100	Bushing, Strain Relief, Liq-Tite	3.00	3.00
56	85-10-150	Adhesive, Sealant (RTV 3145)	1.00	1.00
57	85-10-148	Adhesive, Sealant Silicone, BLK	2.00	2.00

Item No.	Part Number	Description	120V Qty	230V Qty
58	85-10-145	Adhesive, Sealant (Loctite 242)	2.00	2.00
59	81-15-154	Cap & Chain, For #18 Receptacle	1.00	1.00
60	85-10-147	Adhesive Sealant, Pipe Thread	1.00	1.00
61	82-10-484	Jumper, Terminal Block	5.00	5.00
62	83-25-890	Term, Ring Tongue, #18-22AWG, #6, Insul	16.00	16.00
63	99-31-483	Wire, Hookup, #18AWG, IRR PVC, Red	1.00	1.00
64	99-31-482	Wire, Hookup, #18AWG, IRR PVC, Black	3.40	3.40
65	99-31-484	Wire, Hookup, #18AWG, IRR PVC, Green	2.00	2.00
66	99-31-481	Wire, Hookup, #18AWG, IRR PVC, White	2.25	2.25
67	83-51-752	Screw, 2-56 x 1/4"Lg, Btn Hd, Hex, SS	2.00	2.00
68	83-51-763	Screw, 4-40 x 3/8"Lg, Btn Hd, Hex, SS	4.00	4.00
69	83-51-762	Screw, 4-40 x 5/16"Lg, Btn Hd, Hex, SS	2.00	2.00
70	83-51-765	Screw, 4-40 x 1/2"Lg, Btn Hd, Hex, SS	1.00	1.00
71	83-79-152	Screw, 1/4-28 x 1/2"Lg, Skt Hd, Cap, SS	1.00	1.00
72	83-79-051	Screw, 4-40 x 1/2"Lg, Skt Hd, Cap, SS	5.00	5.00
73	83-79-068	Screw, 6-32 x 3/8"Lg, Skt Hd, Cap, SS	5.00	5.00
74	83-79-075	Screw, 6-32 x 1"Lg, Skt Hd, Cap, SS	1.00	1.00
75	83-79-073	Screw, 6-32 x 3/4"Lg, Skt Hd, Cap, SS	2.00	2.00
76	83-79-082	Screw, 8-32 x 3/8"Lg, Skt Hd, Cap, SS	3.00	3.00
77	83-79-114	Screw, 10-32 x 1/2"Lg, Skt Hd, Cap, SS	12.00	12.00
78	83-79-077	Screw, 6-32 x 1-1/4"Lg, Skt Hd, Cap, SS	4.00	4.00
80	83-79-116	Screw, 10-32 x 5/8"Lg, Skt Hd, Cap, SS	7.00	7.00
81	83-87-194	Screw, 8-32x1/2"Lg. Flt Hd, Hex, SS	2.00	2.00
82	83-87-165	Screw, 4-40 x 1/2"Lg, Flt Hd, Hex, SS	2.00	2.00
83	83-87-181	Screw, 6-32 x 5/8"Lg, Flt Hd, Hex, SS	4.00	4.00
84	83-87-182	Screw, 6-32 x 3/4"Lg, Flt Hd, Hex, SS	2.00	2.00
85	83-87-209	Screw, 10-32 x 1/2"Lg, Flt Hd, Hex, SS	4.00	4.00
86	83-87-211	Screw, 10-32 x 5/8"Lg, Flt Hd, Hex, SS	3.00	3.00
87	83-87-214	Screw, 10-32 x 1"Lg, Flt Hd, Hex, SS	3.00	3.00
88	83-87-233	Screw, 1/4-28 x 5/8"Lg, Flt Hd, Hex, SS	2.00	2.00
89	83-40-261	Nut, 6-32 x 5/16, Hex, Steel Plated	1.00	1.00
90	83-40-326	Nut, 1/4-28 x 7/16, Hex, Steel Plated	1.00	1.00
92	83-40-278	Nut, 8-32 x 1/4 x 3/32 Thk, Hex, SS	4.00	4.00
93	83-40-486	Nut, 6-32, Self Locking, Hex, SS	1.00	1.00
94	83-40-283	Nut, 8-32 Std. Hex Pattern, SS	2.00	2.00
96	BM-C121	Jamb Nut, Altered	3.00	3.00
98	83-95-606	Washer, #8, Internal Tooth Lock, SS	2.00	2.00
99	83-95-626	Washer, #4, External Tooth Lock, SS	1.00	1.00
100	83-95-604	Washer, #4, Internal Tooth Lock, SS	9.00	9.00
101	83-95-605	Washer, #6, Internal Tooth Lock, SS	2.00	2.00
102	83-95-631	Washer, 1/4, External Tooth Lock	2.00	2.00
103	83-95-749	Washer, #6, Split Lock, SS	5.00	5.00
104	83-95-752	Washer, #10, Split Lock, SS	10.00	10.00
105	83-95-750	Washer, #8, Split Lock, SS	4.00	4.00
106	83-95-013	Washer, #6, Flat, SS	1.00	1.00
107	83-95-019	Washer, #8, Flat, SS	3.00	3.00
108	83-95-028	Washer, 1/4, Flat, SS	1.00	1.00
109	83-25-996	Terminal, Female Disc, Red	4.00	4.00
110	76-05-005	Filter, Interference, Power Line EMI	1.00	1.00
111	88-99-224	Ferrrite, Split, EMI Suppression	1.00	1.00
112	BM-C212	Label, CE Approval, EMC Directives	1.00	1.00
113	AP-BA-C91	Azimuth Tracker Paint Masking Procedure	-	-
114	TP-BA-C91	Az Tracker Assy Adjustment/Test Procedure	-	-
120	BM-C161/A	Foam, High Den 17-1/4X14X2	2.00	2.00
121	BM-C161/B	Foam, HD 17-1/4X16-1/4X2	3.00	3.00
122	BM-C161/C	Foam, SuperBlu 18X16-1/4X1	1.00	1.00

Figure 10.1-4.3



DOCUMENT NO. BA-C113	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	APPD
	1	FIRST ISSUE		88.9.20	CW	AM
	2	REMOVED NOTE 6	DCN450	90.07.03	FV	KL
	3	REMOVE FIG. 2, ZEN DRIVE KIT	DCN487	90.09.12	FV	KL
	4	ADD SURGE SUPP	DCN538	91.03.19	FV	KL
	5	REMOVE LOCK-WASHERS (ITEM 4)	DCN558	91.10.29	FV	KL
	6	REMOVE REFERENCE TO BA-C83	DCN562	92.03.17	FV	

NOTES:

1. REFER TO PARTS LIST BA-C113 FOR ITEMS LISTED ABOVE, OR MENTIONED IN THESE NOTES. ITEMS TO BE INSTALLED ARE LISTED FOR REFERENCE PURPOSES ONLY AND ARE PART OF OPTION B KIT, DWG NO. BA-C91.
2. REFER TO ACCEPTANCE MANUAL AM-BA-C05 PRIOR TO ASSEMBLY.
3. POSITION SPECTROPHOTOMETER ON TO AZIMUTH TRACKER AS SHOWN AND SECURE USING (4) #10 CAP SCREWS. NOTE THAT THE SPECTROPHOTOMETER IS POSITIONED SUCH THAT THE SIDE WITH THE QUARTZ WINDOW GOES TO THE SIDE OF THE AZIMUTH TRACKER WITH ONLY ONE ROUNDED 3/8" SCREW.
4. CONNECT ALL CABLES TO AZIMUTH TRACKER AND SPECTROPHOTOMETER AS SHOWN.

COMPUTER GENERATED DRAWING
FILENAME: BA-C113.DWG

QTY	UM	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM
1						

SCALE		NEXT ASSY	BA-C91
DATE	88.09.08	DIMENSIONS IN	
DWN	CW	IF DUAL DIMS	mm (inches)
CHKD	RA	Tolerances	(unless otherwise specified)
APPD	RA	INCHES	MM
FINISH		.xx ± .005 .x ± .01 ANGLES ± 1° FRACTIONS ± 1/32	.xx ± 0.13 .x ± 0.25 ANGLES ± 1°

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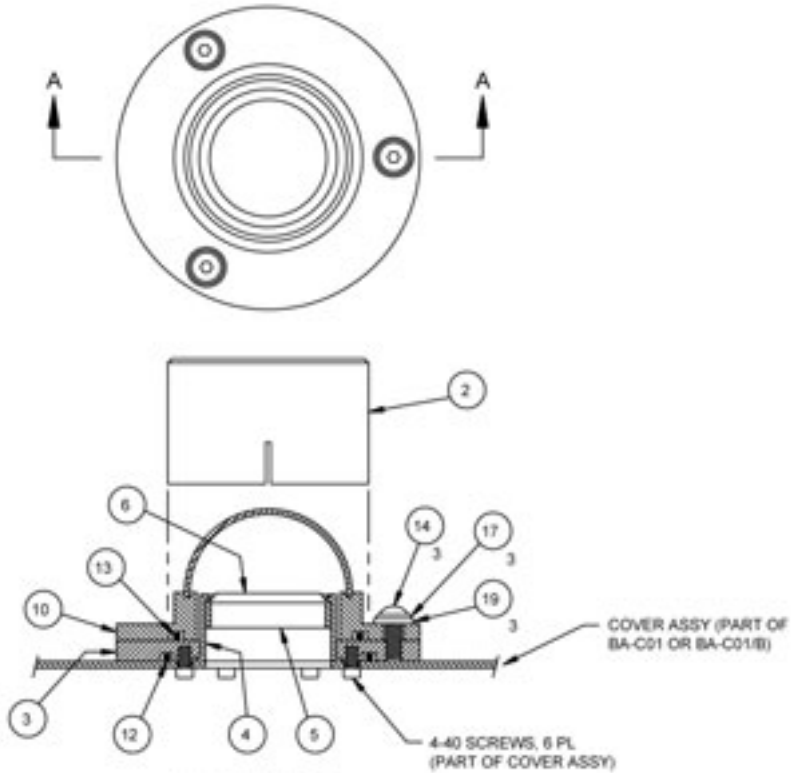
TITLE: OPTION B KIT INSTALLATION

SHEET	DOCUMENT NUMBER	REV
1 OF 1	BA-C113	6

Figure 10.1-5.1



SECTION A-A

FIGURE 1
UVB DOME INSTALLATION
SCALE 1:1

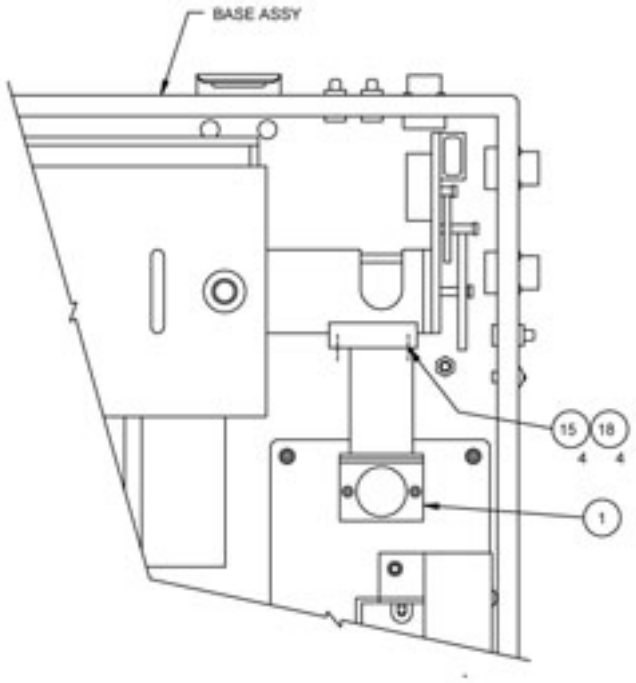


FIGURE 2
UVB PRISM INSTALLATION
SCALE 1:2

NOTES:

1. ITEMS TO BE INSTALLED ARE SHOWN FOR REFERENCE PURPOSES ONLY, AND ARE PART OF OPTION C KIT, DWG BA-C84.
2. UVB DOME INSTALLATION:
   - REFER TO FIGURE 1 (CAUTION' QUARTZ DOME IS FRAGILE)
   - REMOVE SEALING PLATE (P/N BM-C28) AND O-RING (P/N 83-10-739) FROM COVER ASSY, BA-C21 (PART OF BA-C01 OR BA-C01/B). DRILL 3, Ø.20 HOLES THRU SEALING PLATE, SPOT FROM EXISTING PILOT HOLES AND DE-BURR. BAG SEALING PLATE AND O-RING AND ATTACH TO BREWER ASSY.
   - ASSEMBLE ITEMS 4, 5 AND 6 TOGETHER AS SHOWN. THIS PART IS NOW REFERED TO AS "UVB DIFFUSER".
   - USING NEW O-RING (ITEM 12) AND 6 EXISTING 4-40 SCREWS, FASTEN UVB DIFFUSER AND ADAPTER (ITEM 3) TO COVER.
   - ASSEMBLE QUARTZ DOME (ITEM 10) AND O-RING (ITEM 13) USING ITEMS 14, 17 AND 19.
   - NOTE: PROTECTIVE CAP (ITEM 2) SHOULD ALWAYS BE USED IF COVER IS REMOVED OR UNIT IS MOVED FOR ANY REASON. ATTACH END OF CORD TO CARRYING HANDLE.
3. UVB DOME REMOVAL:
   - IF REMOVAL OF THE UVB DOME IS NECESSARY, THE SPARE SEALING PLATE AND O-RING MAY BE USED TO RE-SEAL THE THE OPENING. FASTEN THESE TO THE UVB ADAPTER (ITEM 3) USING EXISTING HARDWARE USED TO MOUNT THE QUARTZ DOME. CAREFULLY WRAP QUARTZ DOME, UVB DIFFUSER AND O-RING AND STORE FOR FUTURE USE.
4. UVB PRISM INSTALLATION:
   - REFER TO FIGURE 2. INSTALL UVB PRISM ASSY USING ITEMS 15 AND 18.

COMPUTER GENERATED DRAWING
FILENAME: BA-C114.DWG

DOCUMENT NO. BA-C114	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	1	INITIAL RELEASE			CW	RA
	2	CHG DOME INSTALLATION (FIG 1)	DCN569	92.01.15	FV	KL
	3	REPLACE DESICCANT WITH HEATER	622	99.02.25	MSB	

QTY	UM	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM
- NO -						

SCALE	1:1	NEXT ASSY	BA-C84
DATE	88.08.08	DIMENSIONS IN	INCHES
DWN	CW	IF DUAL DIMS	inch (inches)
CHKD	RA	Tolerances	unless otherwise specified:
APPD	RA	INCHES	MM
FINISH			

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TITLE: OPTION C KIT INSTALLATION (UVB)

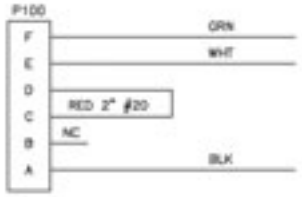
SIZE	SHEET	DOCUMENT NUMBER	REV
C	1 of 1	BA-C114	3

	BA-C113	Installation Kit	
Item No.	Part No.	Description	Qty
1	BA-C91	Azimuth Tracker Assy	1.00
3	83-79-116	Screw, 10-32 x 5/8"Lg, Skt Hd, Cap, SS	4.00

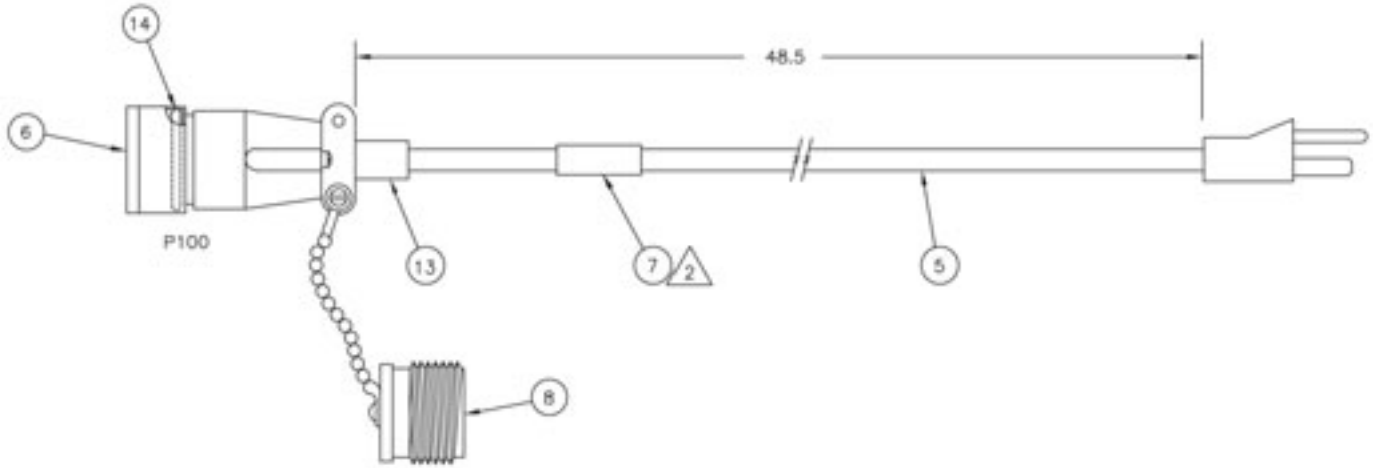
	BA-C84	UV Port Assy	
Item No.	Part No.	Description	Qty
1	BA-F81	UVB Prism Assy	1.00
2	BM-C175	UVB Dome Cap	1.00
3	BM-C37	UVB Adaptor	1.00
4	BM-C38	UVB Dome Light Diffuser Holder	1.00
5	BM-C39	UVB Retaining Ring	1.00
6	BM-C40	UVB Diffuser	1.00
10	10-15-101	Quartz Hemisphere, 50mm MTD	1.00
12	83-10-739	O-Ring, 2-1/4"ID x 2-1/2"OD x 1/8, #228	1.00
13	83-10-737	O-Ring, 2"ID x 2-1/4"OD x 1/8, #226	1.00
14	83-51-834	Screw, 10-32 x 1/2"Lg, Btn Hd Hex, SS	3.00
15	83-79-052	Screw, 4-40 x 9/16"Lg, Skt Hd Cap, SS	4.00
17	83-95-787	Washer, #10, Sealing	3.00
18	83-95-748	Washer, #4, Split Lock, SS	4.00
19	83-95-023	Washer, #10, Flat, SS	3.00

Figure 10.1-6

DOCUMENT NO. BA-W14	REV	DESCRIPTION	DCN NUMBER	DATE	DWN.	APPD.
	1	INITIAL RELEASE	8502-DCN-216	83.03.01	DF	
	2	SEE DCN	362		CW	
	3	SEE DCN	469		CW	RA
	4	REMOVE SMALL BUSHING (ITEM 14)	685	94.05.06	FV	DS



SCHEMATIC DIAGRAM
BA-W12



NOTES:

1. REMOVE THE RUBBER INSULATOR FROM THE INSIDE OF ITEM 6 & DISCARD. AFTER THE WIRES ARE SOLDERED TO THE CONNECTOR, USE ITEM 15 AND SEAL AROUND ALL THE SOLDER CUPS. THEN INSTALL THE PLASTIC SHELL OVER IT.

△2 MARK CABLE WITH PART NO. WHERE SHOWN.

QTY. — NO.	U/M	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM

SCALE	1:1	NEXT ASSY:	BA-C01
DATE	83.03.01	DIMENSIONS IN	FEET
DWN	DF	IF DUAL DIMS:	mm (inches)
CHKD	DW	Tolerances (unless otherwise specified)	
APPD	KL	INCHES	MM
FINISH		.xxx ± .005 .xx ± .01 ANGLES ± 1° FRACTIONS ± 1/32	.xx ± 0.13 .x ± 0.25 ANGLES ± 1°

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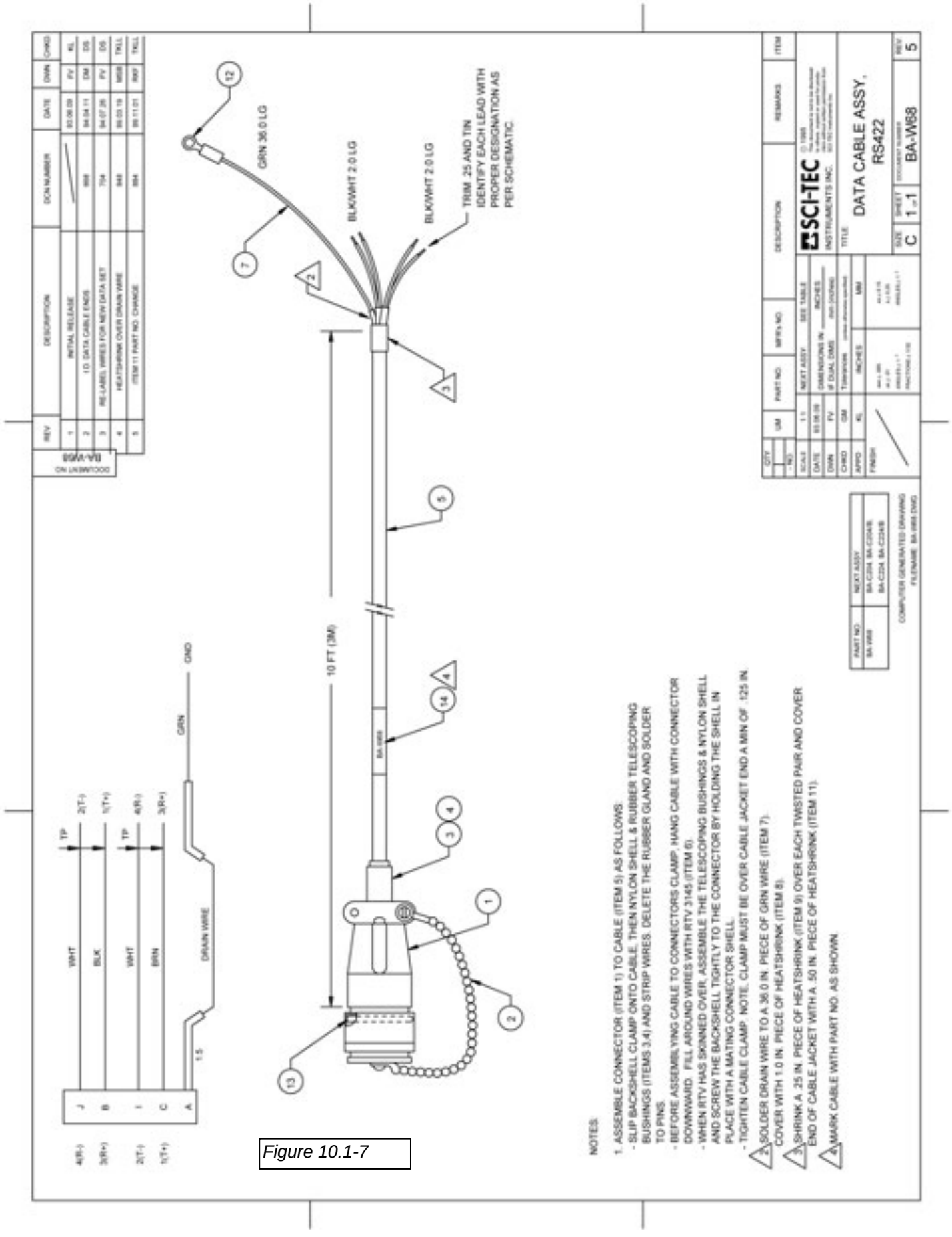
TITLE: POWER CABLE ASSY, BREWER

SHEET 1 OF 1 | DOCUMENT NUMBER BA-W12 | REV. 4

COMPUTER GENERATED DRAWING
FILENAME: BA-W12.DWG


DATA CABLE ASSY, RS422
SCI-TEC INSTRUMENTS INC.
BA-W68
NOTES
1. ASSEMBLE CONNECTOR (ITEM 1) TO CABLE (ITEM 5) AS FOLLOWS
- SLIP BACKSHELL CLAMP ONTO CABLE, THEN NYLON SHELL & RUBBER TELESCOPING BUSHINGS (ITEMS 3,4) AND STRIP WIRES. DELETE THE RUBBER GLAND AND SOLDER TO PINS
- BEFORE ASSEMBLYING CABLE TO CONNECTORS CLAMP, HANG CABLE WITH CONNECTOR DOWNWARD. FILL AROUND WIRES WITH RTV 3145 (ITEM 6)
- WHEN RTV HAS SKINNED OVER, ASSEMBLE THE TELESCOPING BUSHINGS & NYLON SHELL AND SCREW THE BACKSHELL TIGHTLY TO THE CONNECTOR BY HOLDING THE SHELL IN PLACE WITH A MATING CONNECTOR SHELL.
- TIGHTEN CABLE CLAMP. NOTE: CLAMP MUST BE OVER CABLE JACKET END A MIN OF .125 IN.
2. SOLDER DRAIN WIRE TO A 36.0 IN. PIECE OF GRN WIRE (ITEM 7). COVER WITH 1.0 IN. PIECE OF HEATSHRINK (ITEM 8).
3. SHRINK A .25 IN. PIECE OF HEATSHRINK (ITEM 9) OVER EACH TWISTED PAIR AND COVER END OF CABLE JACKET WITH A .50 IN. PIECE OF HEATSHRINK (ITEM 11).
4. MARK CABLE WITH PART NO. AS SHOWN
10 FT (3M)
GRN 36.0 LG
BLK/WHT 2.0 LG
BLK/WHT 2.0 LG
TRIM .25 AND TIN
IDENTIFY EACH LEAD WITH
PROPER DESIGNATION AS
PER SCHEMATIC
WHT
BLK
WHT
BRN
DRAIN WIRE
GRN
GND
2(T-)
1(T+)
4(R-)
3(R+)
TP
TP
1:5
J
B
I
C
A
4(R-)
3(R+)
2(T-)
1(T+)
REV
DESCRIPTION
DCN NUMBER
DATE
DWN
CHKD
INITIAL RELEASE
I.D. DATA CABLE ENDS
RE-LABEL WIRES FOR NEW DATA SET
HEATSHRINK OVER DRAIN WIRE
ITEM 11 PART NO. CHANGE
93.08.09
94.04.11
94.07.26
95.03.19
99.11.01
PV
DM
PV
MSB
RKF
KL
DS
DS
TKLL
TKLL
DOCUMENT NO
BA-W68
PART NO
BA-W68
NEXT ASSY
BA-C204, BA-C204/B, BA-C204, BA-C204/B
COMPUTER GENERATED DRAWING
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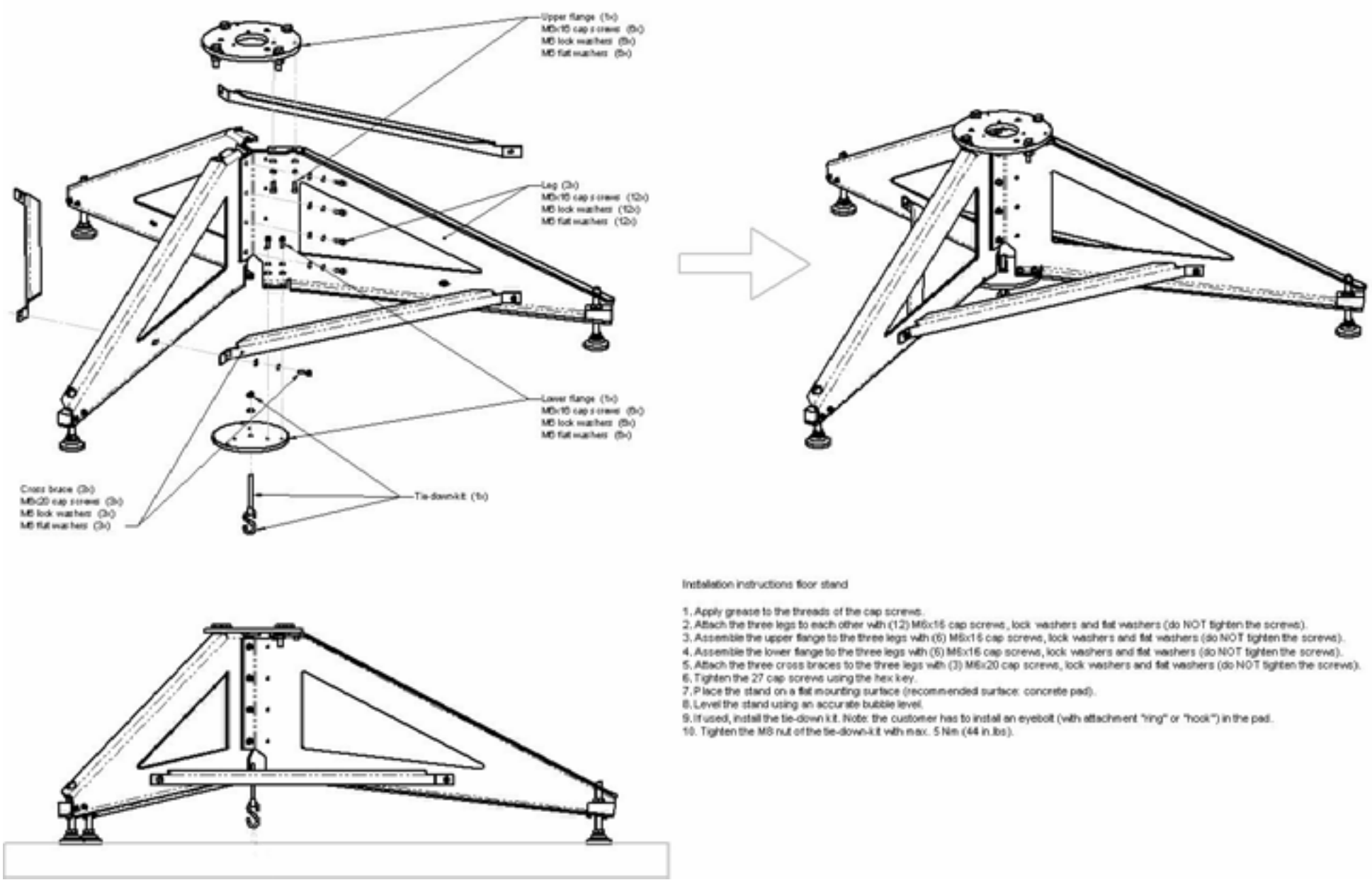
QTY
ITEM
REMARKS
DESCRIPTION
SCALE
1:1
NEXT ASSY
SEE TABLE
DATE
93.08.09
DIMENSIONS IN
INCHES
DWN
PV
DUAL DIMS
CHKD
DM
TOLERANCES
APPD
KL
INCHES
MM
FINISH
SIZE
C
SHEET
1 of 1
DOCUMENT NUMBER
BA-W68
REV
5

Figure 10.1-7

Item No.	BA-C222 Part No.	Brewer Electronics Spares Kit Description	Qty
2	BA-C99	Azimuth Tracker Board Assy	1.00
3	BA-E103/B	Power Supply Assy, 12V	1.00
4	BA-E124	Electronic PCB Brkt Assy	1.00
5	BA-P23	High Speed Amp Board Assy	1.00
6	BA-W76/A	CABLE ASSY, MAIN TO MOTOR, 29.0	1.00
7	BA-W76/B	CABLE ASSY, MAIN TO MOTOR, 27.0	1.00
8	BA-W76/C	CABLE ASSY, MAIN TO MOTOR, 20.0	1.00
9	BA-W77/B	CABLE ASSY, MAIN TO HV, 16.0	1.00
10	BA-W78	CABLE ASSY, HV BRD TO PMT	1.00
11	70-10-020	Silica Gel Indicating	2.00
12	93-70-401	Standard Lamp	3.00
13	93-70-406	Lamp, HG Germicidal	3.00
14	87-50-088	Power Supply, Switching, 5VDC, 10A	1.00
15	70-10-015	Desiccant Bag	6.00
16	75-01-020	Battery, Lithium, 3V, 1AH	1.00

Item No.	BA-C112/B Part No.	BREWER Standard Spares Kit Description	Qty
1	12501365-2	Desiccant Holder Assy	1.00
2	70-10-014	Desiccant Cartridge	--
3	70-10-013	Desiccant Humidity Indicator	2.00
4	70-10-015	Desiccant, 4 Unit, Type II, TYVEK Bag	3.00
5	93-70-401	Lamp, Tungsten, Halogen, 20W, 12V	2.00
6	93-70-406	Lamp, HG Germicidal (GTL3)	2.00
7	91-15-217	Fuse, 5A, 250V, Fast-Blow	2.00
8	91-15-257	Fuse, 2A, 125V, Slow-Blow	--
9	91-15-220	Fuse, 1A, 250V, FB, 5X20MM	2.00
10	91-15-834	Fuse, 2A, 250V, SB 5X20MM	2.00
11	91-15-223	Fuse, 2A, 250V, FB, 5X20MM	2.00
12	91-15-280	Fuse, 4A, 125V, SB, 5X20MM	2.00
13	92-90-002	Tool, Hex Key, .035"	1.00
14	92-90-020	Allen Wrench Kit, Ball Point	1.00
15	83-79-116	Screw, #10-32 x 5/8"Lg, Skt Hd Cap, SS	4.00
16	92-22-050	Insertion/Extraction Tool, 'D' Connector	1.00

Figure 10.1-8



Installation instructions floor stand

1. Apply grease to the threads of the cap screws.
2. Attach the three legs to each other with (12) M6x16 cap screws, lock washers and flat washers (do NOT tighten the screws).
3. Assemble the upper flange to the three legs with (6) M6x16 cap screws, lock washers and flat washers (do NOT tighten the screws).
4. Assemble the lower flange to the three legs with (6) M6x16 cap screws, lock washers and flat washers (do NOT tighten the screws).
5. Attach the three cross braces to the three legs with (3) M6x20 cap screws, lock washers and flat washers (do NOT tighten the screws).
6. Tighten the 27 cap screws using the hex key.
7. Place the stand on a flat mounting surface (recommended surface: concrete pad).
8. Level the stand using an accurate bubble level.
9. If used, install the tie-down kit. Note: the customer has to install an eyebolt (with attachment "ring" or "hook") in the pad.
10. Tighten the M8 nut of the tie-down kit with max. 5 Nm (44 in.lbs).

BREWER REFERENCE DOCUMENTATION

Section 10.2 Power Supply and Harness	**Figure**
- Main Power Connect Cable Assembly BA-W80	10.2-1
- Primary AC power Interconnect Harness Assembly BA-W81	10.2-2
- Power Supply Assembly BA-E103/B	10.2-2.1
- Power Supply data sheet	10.2-2.2
	10.2-2.3

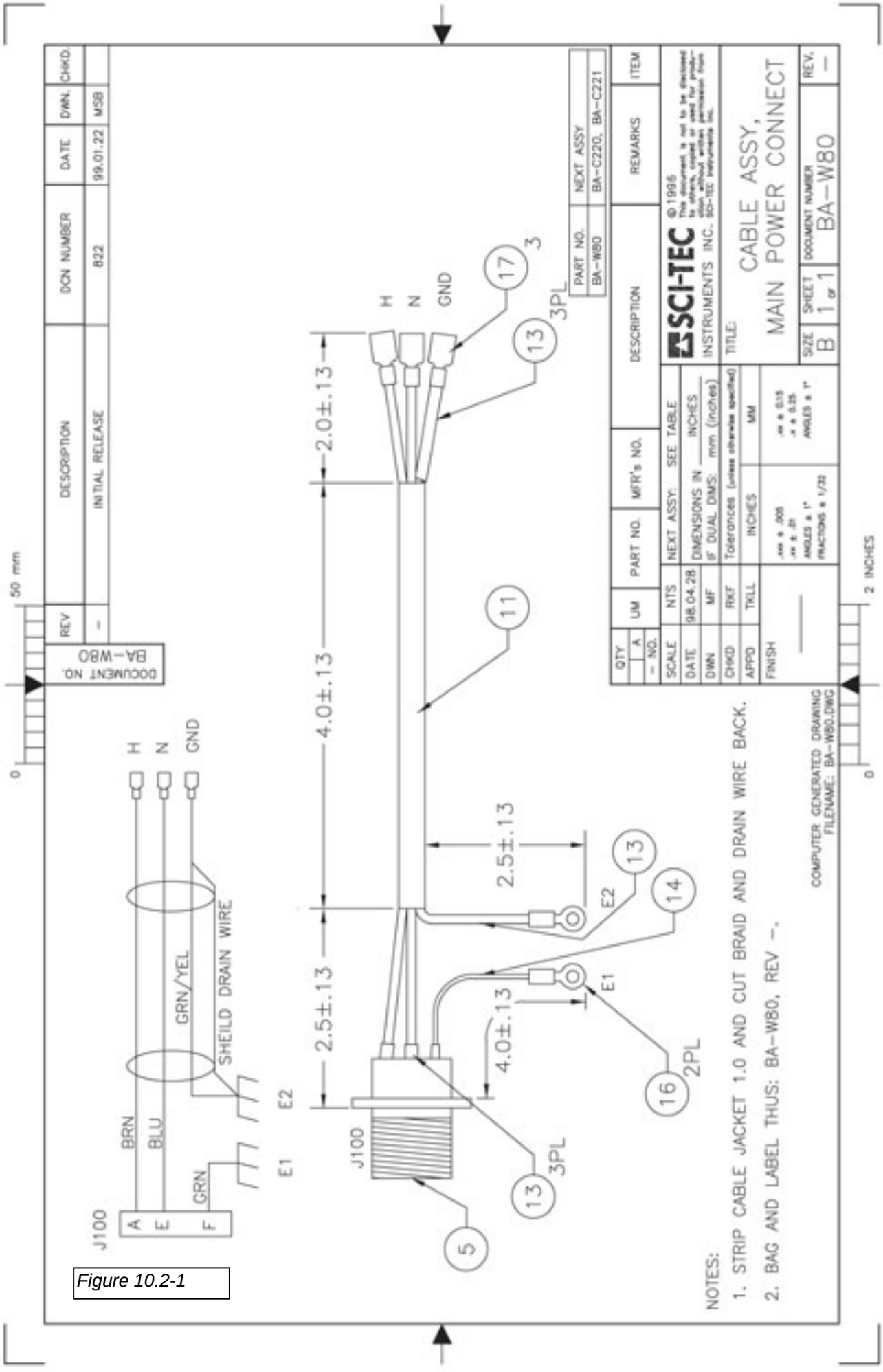

CABLE ASSY, MAIN POWER CONNECT
BA-W80
SCI-TEC
INSTRUMENTS INC.
NOTES:
1. STRIP CABLE JACKET 1.0 AND CUT BRAID AND DRAIN WIRE BACK.
2. BAG AND LABEL THUS: BA-W80, REV -.
H
N
GND
BRN
BLU
GRN
GRN/YEL
SHEILD DRAIN WIRE
J100
2.0±.13
4.0±.13
2.5±.13
3PL
2PL
E1
E2

Figure 10.2-1

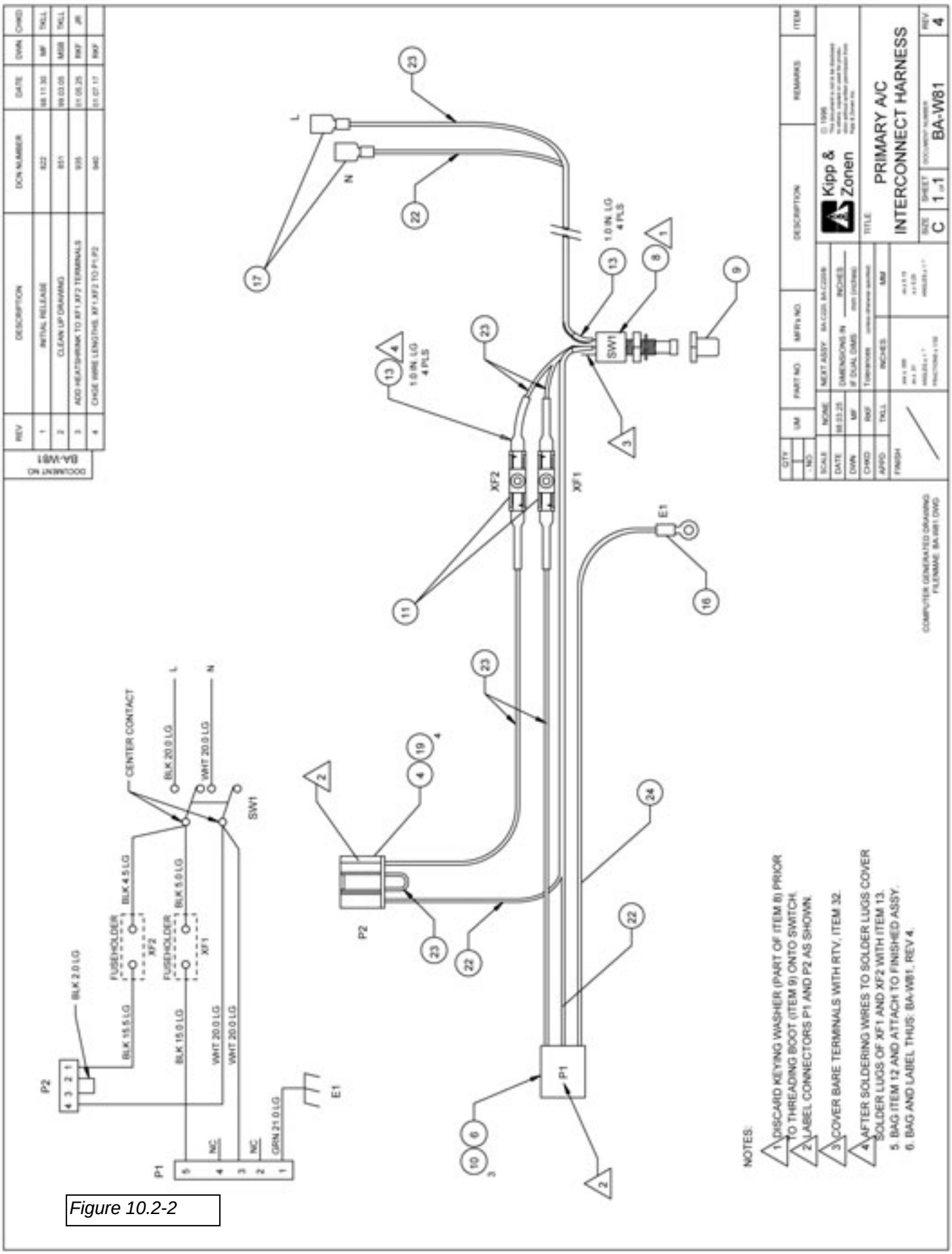

PRIMARY A/C
INTERCONNECT HARNESS
Kipp & Zonen
BA-W81
NOTES:
1. DISCARD KEYING WASHER (PART OF ITEM 8) PRIOR TO THREADING BOOT (ITEM 9) ONTO SWITCH.
2. LABEL CONNECTORS P1 AND P2 AS SHOWN.
3. COVER BARE TERMINALS WITH RTV, ITEM 32.
4. AFTER SOLDERING WIRES TO SOLDER LUGS COVER SOLDER LUGS OF XF1 AND XF2 WITH ITEM 13.
5. BAG ITEM 12 AND ATTACH TO FINISHED ASSY.
6. BAG AND LABEL THUS: BA-W81, REV 4.
P1
P2
XF1
XF2
SW1
E1
CENTER CONTACT
BLK 2.0 LG
BLK 15.5 LG
BLK 4.5 LG
BLK 15.0 LG
BLK 5.0 LG
BLK 20.0 LG
WHT 20.0 LG
GRN 21.0 LG
NC
10 IN. LG 4 PLS

Figure 10.2-2

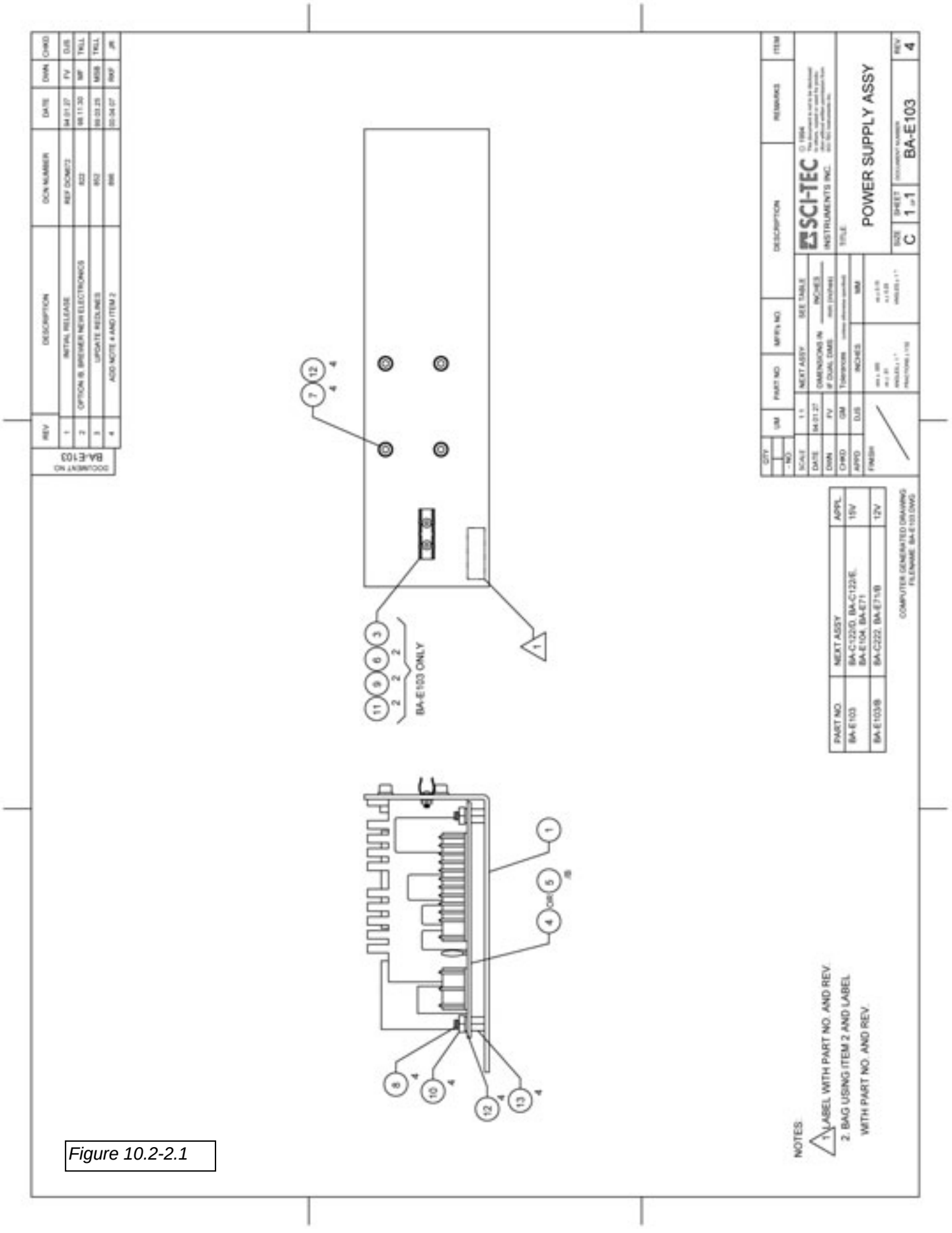


Figure 10.2-2.1

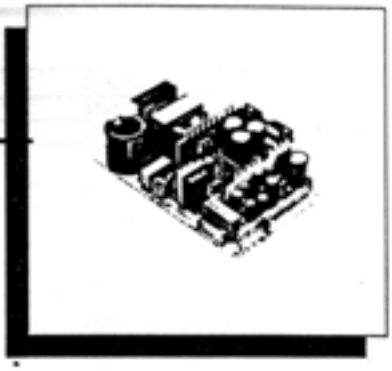
Item No.	BA-E103/B Part No.	Power Supply Assembly Description	Qty
1	BM-E102	Mounting Bracket, Main Power Supply	1.00
3	89-90-220	Mounting Clip, Axial Lead Resistor	--
4	87-50-098	Power Supply, 80W, O/P,Switch,+-15V	--
5	87-50-099	Power Supply, 80W, O/P,Switch,+-12V	1.00
6	83-51-752	Screw, #2-56 x 1/4"Lg, Btn Hd Hex, SS	--
7	83-79-068	Screw, #6-32 x 3/8"Lg, Skt Hd Hex	4.00
8	83-85-724	Screw, #6-32 x 5/8"Lg, Flt Hd, 100Deg, SS	4.00
9	83-40-219	Nut, #2-56 x 3/16", Hex, SS	--
10	83-40-261	Nut, #6-32 x 5/16", Hex, SS	4.00
11	83-95-603	Washer, #2, Internal Tooth Lock, SS	--
12	83-95-605	Washer, #6, Internal Tooth Lock, SS	8.00
13	83-09-210	Spacer, Threaded, #6-32 x 1/4"Lg, Hex	4.00

NFS80 SERIES
80 Watt Universal Input Switching Power Supplies

- Balanced-current auxiliary outputs
- Universal input voltage
- Overvoltage protection
- Short circuit protection with auto-recovery
- 80 watts continuous, 110 watts peak output power
- Two year warranty
- Recommended for new designs

ELECTRO SOURCE!

NEW!



The NFS80 series consist of universal input, four output switching power supplies useful in motor or line driver applications. The equally rated or "balanced" outputs will each deliver up to 3A continuous and 6A peak output current. Furthermore, these supplies will deliver 80 total continuous watts with natural convection cooling, or 110 watts with forced air cooling. For starting loads such as disk drives, they will deliver 110 peak watts.

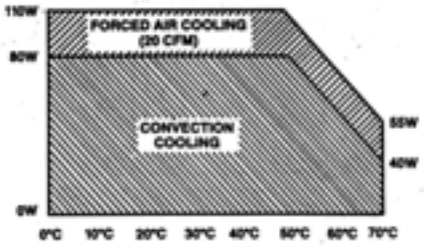
Universal input allows the supply to operate from any line voltage throughout the world without a switch or jumper setting. The NFS80 series is approved by UL, CSA and VDE, and its built-in line filter reduces conducted noise below FCC and VDE limit B.

Model Number	Output Voltage[1]	Minimum	Output Currents Maximum[2]	Maximum[3]	Peak[4]	Ripple P-P[5]	Total Regulation[6]
NFS80-7602	+5V (A)	1A	8A	12A	20A	50mV	±2%
	+24V (B)	0A	2A	2.5A	3A	240 mV	+10%-5%
	+12V (C)	0A	2.5A	3A	6A	120mV	±3%
	12V (D)	0A	2.5A	3A	6A	120mV	±3%
NFS80-7606	+5V (A)	1A	8A	12A	20A	50mV	±2%
	+24V (B)	0A	2A	2.5A	3A	240mV	+10%-5%
	+15V (C)	0A	2.5A	3A	6A	150mV	±3%
	15V (D)	0A	2.5A	3A	6A	150mV	±3%

Notes:
(1) The floating fourth output (D) can be referenced as either positive or negative.
(2) Natural convection cooling.
(3) Forced air cooling, 20 CFM @ 1 atmosphere.
(4) Peak output current lasting less than 60 seconds with duty cycle ≤ 10%. During peak loading, outputs may exceed total regulation limits.
(5) 50 MHz bandwidth, peak-to-peak, measured differentially.
(6) Total regulation is defined as the static output regulation at 25°C, including initial tolerance, line voltage within stated limits, load currents within stated limits, and output voltages adjusted to their factory settings. Also, for stated regulation on the +24V output, I(A)/I(B) ≤ 5.

Operating Temperature Limits and Output Power Range

For optimum reliability, no part of the heatsink should exceed 110°C, and no semiconductor case temperature should exceed 115°C. CAUTION: make primary circuit thermal measurements approximately one second after disconnecting line power to minimize shock hazard and damage to thermal measurement equipment.



COMPUTER PRODUCTS A

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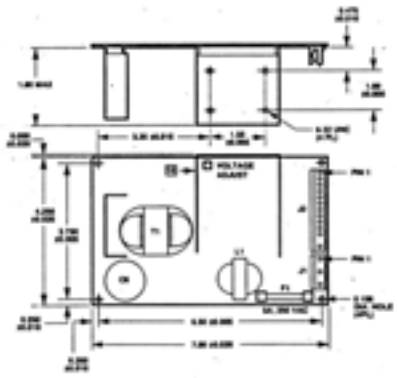
Figure 10.2-2.2

SPECIFICATIONS

Parameter	Condition	Limits
Input Voltage		85VAC to 264VAC
Input Frequency Range		47Hz to 440Hz
Input Surge Current	Cold start 115VAC 230VAC	17A max 34A max
Conducted RFI		FCC limit B, VDE limit B
Safety Ground Leakage Current	110VAC, 60Hz 233VAC, 50Hz	0.2 mA maximum 0.4 mA maximum
Line Regulation	Low line to high line, full load	±0.1% max
Overshoot/Undershoot	Turn-on	None
Transient Response	+5V output, 2.5A to 5A load change	150mV transient, setting to 1% in 1mS
Temperature Coefficient	All outputs	0.02%/C
Overvoltage Protection Threshold	+5V output	6.25V ±0.75V
Output Voltage Adjustability	+5V output	±3%
Total Output Power	50C ambient temperature Continuous, convection cooling forced air cooling Peak	 80 watts 110 watts 110 watts
Holdup Time		80W 110W
	220VAC input	140mS 100mS
	180VAC input	80mS 50mS
	115VAC input	35mS 17mS
	90VAC input	12mS 8mS
Efficiency	115VAC input, 80W	70% typical
Operating Frequency	0W, 90 to 264VAC 110W, 90 to 264VAC	100 to 250 kHz 20 to 70 kHz
Altitude	Operating Non-operating	10,000 feet max 40,000 feet max
Temperature	Operating Non-operating	0C to 50C −40C to +85C
Relative Humidity	Non-condensing	5% to 95%
Vibration	Three orthogonal axes, random vibration, 10 minute test for each axis	2.4G rms (appx) 5Hz to 500Hz
MTBF	MIL-HDBK 217E, 25C	125,000 hr
Weight		1.3 lb (0.6 Kg)

PIN CHART — CONNECTOR

J1			
Pin 1	AC Ground	AC Ground	Molex 09-50-3051 with second and fourth pins removed
Pin 2	AC Neutral	AC Neutral	
Pin 3	AC Hot	AC Hot	
J2			
Pin 1	+5.1V	+5.1V	Molex 09-50-3131 Mating connector: Molex 2139 series housing with 2878 series crimp terminal.
Pin 2	+5.1V	+5.1V	
Pin 3	+5.1V	+5.1V	
Pin 4	Return	Return	
Pin 5	Return	Return	
Pin 6	Return	Return	
Pin 7	Return	Return	
Pin 8	+12V	+15V	
Pin 9	+12V	+15V	
Pin 10	−12V Ret	−15V Ret	
Pin 11	−12V	−15V	
Pin 12	Removed for key		
Pin 13	+24V	+24V	



(7) Pins 10 and 11 are a floating output, which can be referenced as either positive or negative. Pin 10 is positive with respect to pin 11. Either pin 10 or 11 must be connected to Return (pins 4-7) for proper operation.
(8) All dimensions are in inches and (mm).
(9) Either metallic or non-metallic standoffs can be used in all four mounting holes without affecting VDE safety approval. The diameter of metal standoffs, if used, must not exceed 0.212".
(10) This heat sink is grounded, and allows system grounding when mechanically connected to the system chassis. Alternatively, the ground pad encircling the mounting hole near J1 allows system grounding through a metal standoff to the system chassis.
(11) It is always advisable to attach the power supply heat sink to another thermal dissipator (such as a chassis, a finned heat sink, etc.). The resulting temperature decrease of heat sink-mounted components will improve power supply lifetime.
(12) The supply must be mechanically supported using the PCB mounting holes, and may be additionally supported by the heat sink mounting holes.

B COMPUTER PRODUCTS
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Figure 10.2-2.3

BREWER REFERENCE DOCUMENTATION

Section 10.3 Internal Cabling	**Figure**
- Communication Cable Assembly BA-W84	10.3-1
- Internal Azimuth Drive Cable Assembly BA-W31	10.3-2
- DC to main & lamp Cable Interconnect Harness BA-W82	10.3-3
- Control Switch Cable assembly BA-W55	10.3-4
- Lamp Cable assembly BA-W83	10.3-5
- Motor Connectors Cable assembly BA-W76	10.3.6
- Main Lamp and HV Cable assembly BA-W77	10.3.7
- Hv board to PMT Cable assembly BA-W78	10.3.8

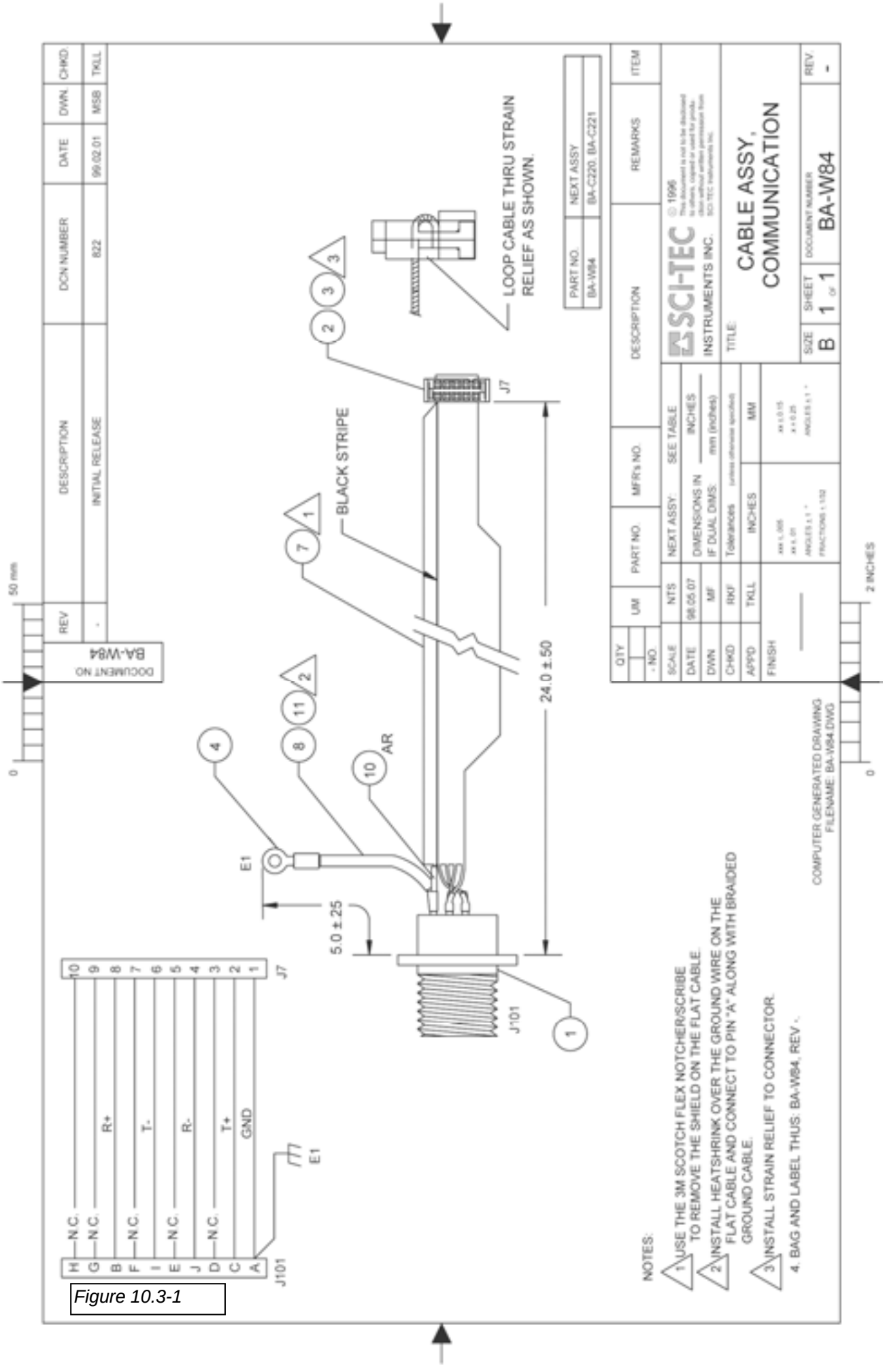

BA-W84
DOCUMENT NO
REV
DESCRIPTION
DCN NUMBER
DATE
DWN.
CHKD.
INITIAL RELEASE
822
99.02.01
MSB
TKLL
PART NO.
NEXT ASSY
BA-W84
BA-C220, BA-C221
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
BLACK STRIPE
J7
J101
E1
24.0 ±.50
5.0 ±.25
AR
J1
J2
J3
J4
J7
J8
J10
J11
QTY
UM
PART NO.
MFR's NO.
DESCRIPTION
REMARKS
ITEM
SCALE NTS
NEXT ASSY: SEE TABLE
DATE 98.05.07
DIMENSIONS IN INCHES
DWN MF
IF DUAL DIMS: mm (inches)
CHKD RKF
Tolerances (unless otherwise specified)
APPD TKLL
INCHES MM
FINISH
SCI-TEC INSTRUMENTS INC.
TITLE:
CABLE ASSY, COMMUNICATION
SIZE B
SHEET 1 OF 1
DOCUMENT NUMBER BA-W84
REV -
COMPUTER GENERATED DRAWING
FILENAME: BA-W84.DWG
NOTES:
1. USE THE 3M SCOTCH FLEX NOTCHER/SCRIBE TO REMOVE THE SHIELD ON THE FLAT CABLE.
2. INSTALL HEATSHRINK OVER THE GROUND WIRE ON THE FLAT CABLE AND CONNECT TO PIN "A" ALONG WITH BRAIDED GROUND CABLE.
3. INSTALL STRAIN RELIEF TO CONNECTOR.
4. BAG AND LABEL THUS: BA-W84, REV -.
N.C.
R+
T-
R-
T+
GND
50 mm
0
2 INCHES
0

Figure 10.3-1

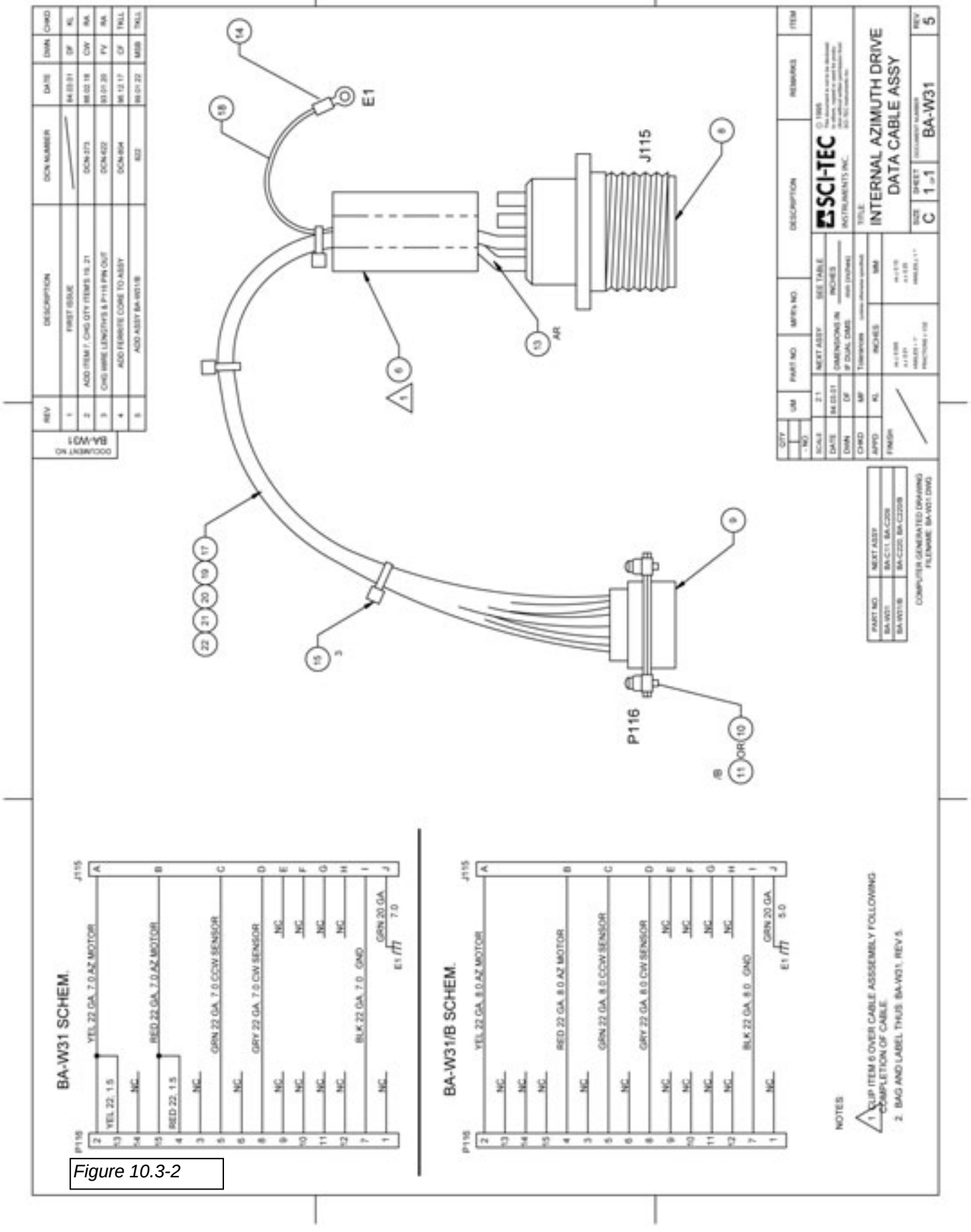

BA-W31 SCHEM.
BA-W31/B SCHEM.
NOTES
INTERNAL AZIMUTH DRIVE DATA CABLE ASSY
SCI-TEC
BA-W31
J115
P116
E1

Figure 10.3-2

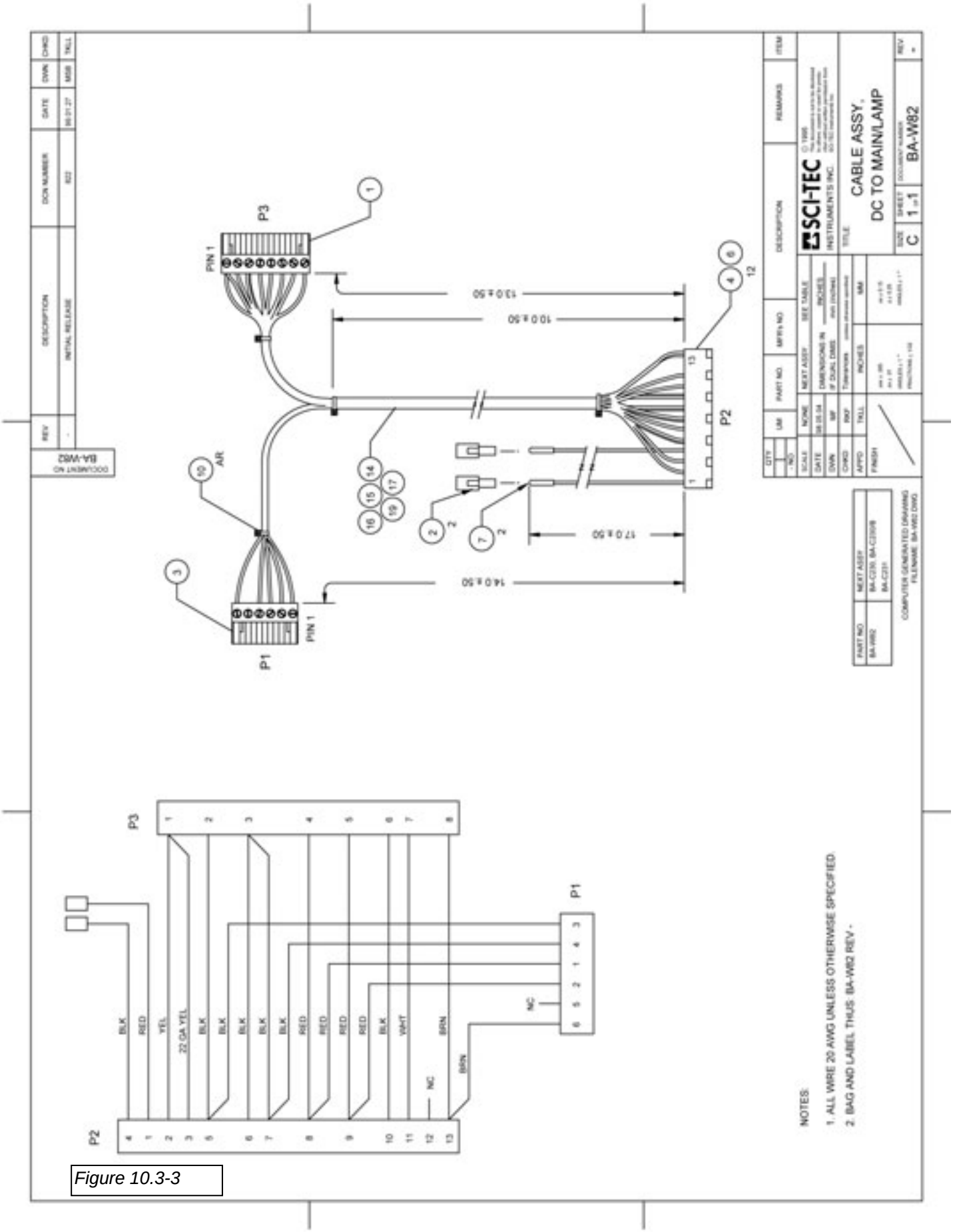
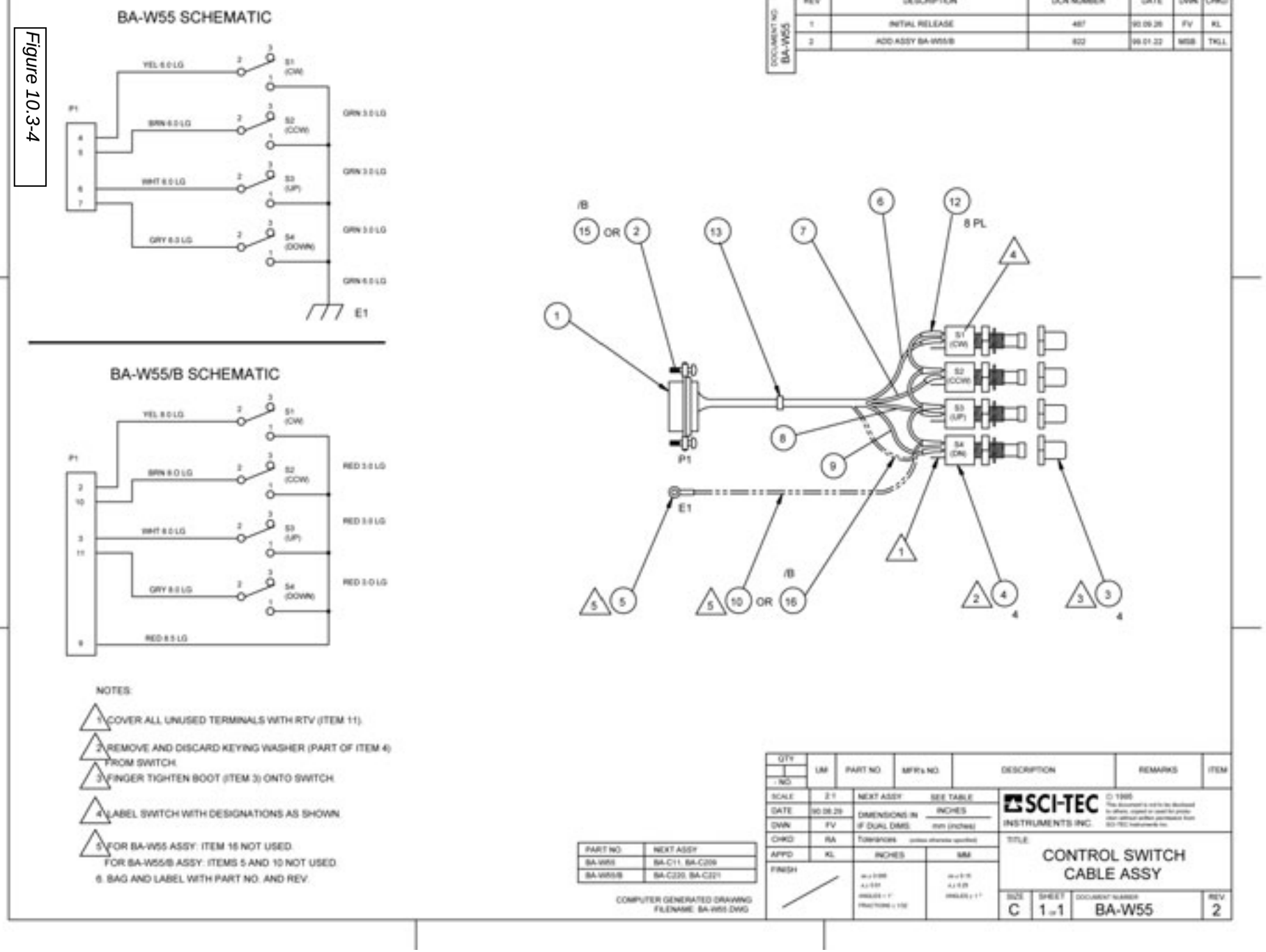

CABLE ASSY,
DC TO MAIN/LAMP
SCI-TEC
INSTRUMENTS INC.
BA-W82
P1
P2
P3
NOTES:
1. ALL WIRE 20 AWG UNLESS OTHERWISE SPECIFIED
2. BAG AND LABEL THUS: BA-W82 REV -

Figure 10.3-3

Figure 10.3-4


BA-W55 SCHEMATIC
YEL 6.0 LG
BRN 6.0 LG
WHT 6.0 LG
GRY 6.0 LG
S1 (CW)
S2 (CCW)
S3 (UP)
S4 (DOWN)
GRN 3.0 LG
GRN 6.0 LG
P1
E1
BA-W55/B SCHEMATIC
RED 3.0 LG
RED 6.0 LG
NOTES:
1. COVER ALL UNUSED TERMINALS WITH RTV (ITEM 11).
2. REMOVE AND DISCARD KEYING WASHER (PART OF ITEM 4) FROM SWITCH.
3. FINGER TIGHTEN BOOT (ITEM 3) ONTO SWITCH.
4. LABEL SWITCH WITH DESIGNATIONS AS SHOWN.
5. FOR BA-W55 ASSY: ITEM 16 NOT USED.
FOR BA-W55/B ASSY: ITEMS 5 AND 10 NOT USED.
6. BAG AND LABEL WITH PART NO. AND REV.
8 PL
OR
/B
PART NO. NEXT ASSY
BA-W55 BA-C11, BA-C209
BA-W55/B BA-C220, BA-C221
COMPUTER GENERATED DRAWING
FILENAME: BA-W55.DWG
DOCUMENT NO BA-W55
REV DESCRIPTION DCN NUMBER DATE DWN CHKD
1 INITIAL RELEASE 487 90.09.26 FV KL
2 ADD ASSY BA-W55/B 622 99.01.22 MSB TKLL
QTY UM PART NO. MFR's NO. DESCRIPTION REMARKS ITEM
SCALE 2:1
DATE 90.09.29
DWN FV
CHKD RA
APPD KL
NEXT ASSY SEE TABLE
DIMENSIONS IN INCHES
IF DUAL DIMS. mm (inches)
Tolerances
INCHES MM
FINISH
SCI-TEC INSTRUMENTS INC.
TITLE
CONTROL SWITCH CABLE ASSY
SIZE C
SHEET 1 of 1
DOCUMENT NUMBER BA-W55
REV 2

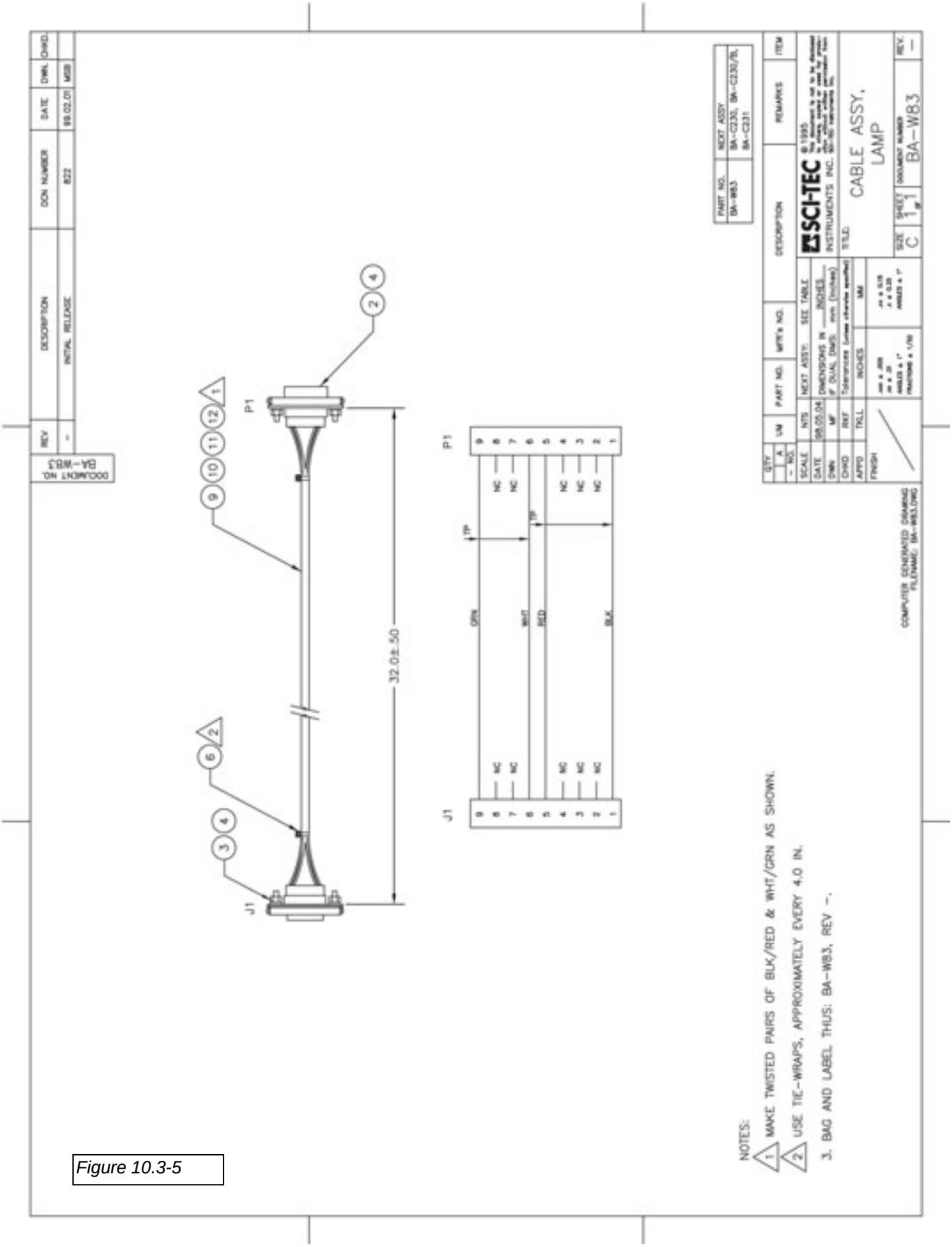
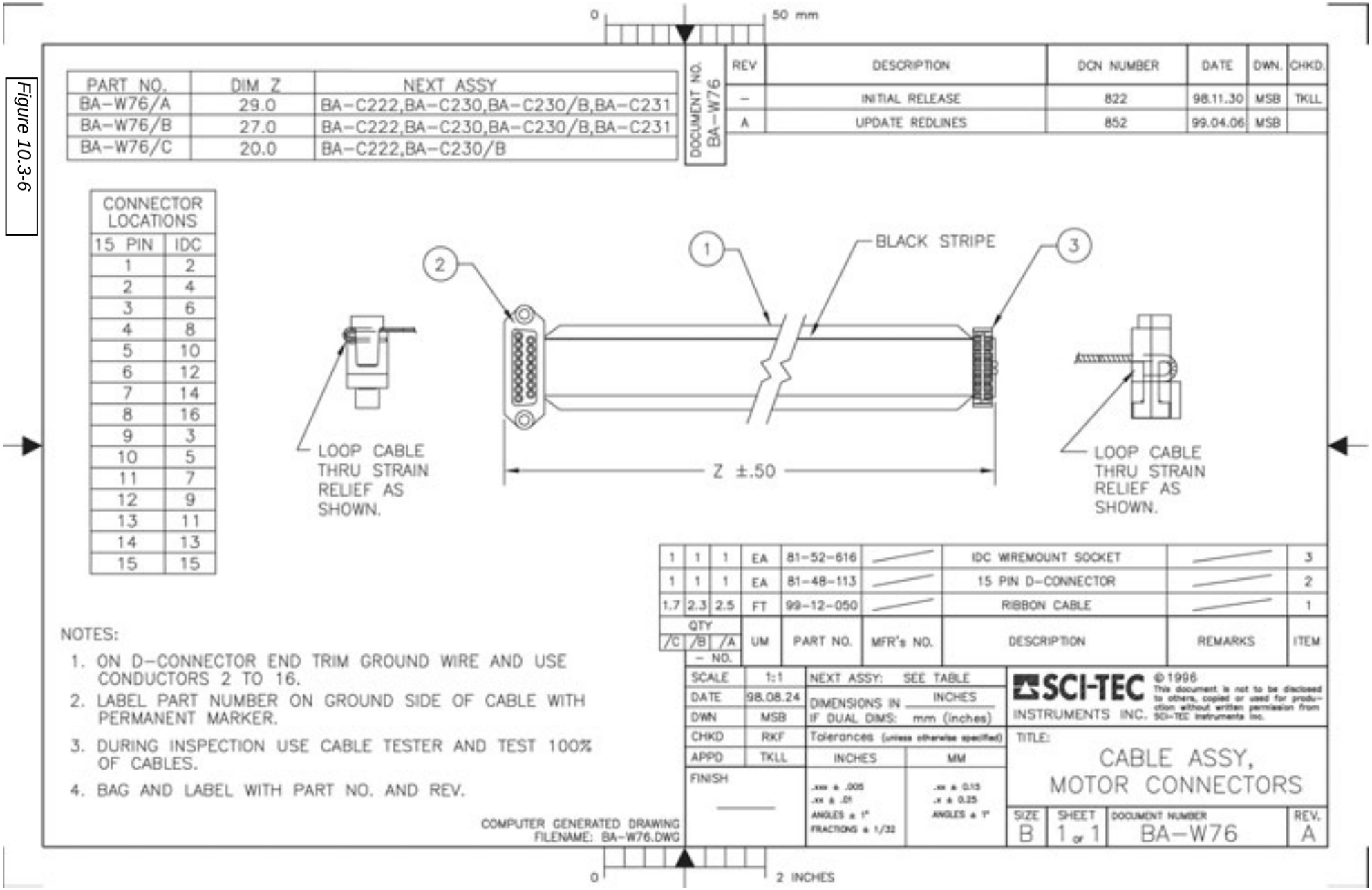

NOTES:
1. MAKE TWISTED PAIRS OF BLK/RED & WHT/GRN AS SHOWN.
2. USE TIE-WRAPS, APPROXIMATELY EVERY 4.0 IN.
3. BAG AND LABEL THUS: BA-W83, REV -.
P1
J1
32.0±.50
NC
GRN
WHT
RED
BLK
SCI-TEC
CABLE ASSY, LAMP
BA-W83

Figure 10.3-5


0
50 mm
DOCUMENT NO. BA-W76
REV | DESCRIPTION | DCN NUMBER | DATE | DWN. | CHKD.
– | INITIAL RELEASE | 822 | 98.11.30 | MSB | TKLL
A | UPDATE REDLINES | 852 | 99.04.06 | MSB |
PART NO. | DIM Z | NEXT ASSY
BA-W76/A | 29.0 | BA-C222,BA-C230,BA-C230/B,BA-C231
BA-W76/B | 27.0 | BA-C222,BA-C230,BA-C230/B,BA-C231
BA-W76/C | 20.0 | BA-C222,BA-C230/B
CONNECTOR LOCATIONS
15 PIN | IDC
1 | 2
2 | 4
3 | 6
4 | 8
5 | 10
6 | 12
7 | 14
8 | 16
9 | 3
10 | 5
11 | 7
12 | 9
13 | 11
14 | 13
15 | 15
2
1
BLACK STRIPE
3
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
Z ±.50
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
1 | 1 | 1 | EA | 81-52-616 | IDC WIREMOUNT SOCKET | 3
1 | 1 | 1 | EA | 81-48-113 | 15 PIN D-CONNECTOR | 2
1.7 | 2.3 | 2.5 | FT | 99-12-050 | RIBBON CABLE | 1
QTY /C /B /A – NO. | UM | PART NO. | MFR's NO. | DESCRIPTION | REMARKS | ITEM
NOTES:
1. ON D-CONNECTOR END TRIM GROUND WIRE AND USE CONDUCTORS 2 TO 16.
2. LABEL PART NUMBER ON GROUND SIDE OF CABLE WITH PERMANENT MARKER.
3. DURING INSPECTION USE CABLE TESTER AND TEST 100% OF CABLES.
4. BAG AND LABEL WITH PART NO. AND REV.
COMPUTER GENERATED DRAWING
FILENAME: BA-W76.DWG
SCALE 1:1
DATE 98.08.24
DWN MSB
CHKD RKF
APPD TKLL
FINISH
NEXT ASSY: SEE TABLE
DIMENSIONS IN INCHES
IF DUAL DIMS: mm (inches)
Tolerances (unless otherwise specified)
INCHES: .xxx ± .005, .xx ± .01, ANGLES ± 1°, FRACTIONS ± 1/32
MM: .xx ± 0.13, .x ± 0.25, ANGLES ± 1°
SCI-TEC INSTRUMENTS INC.
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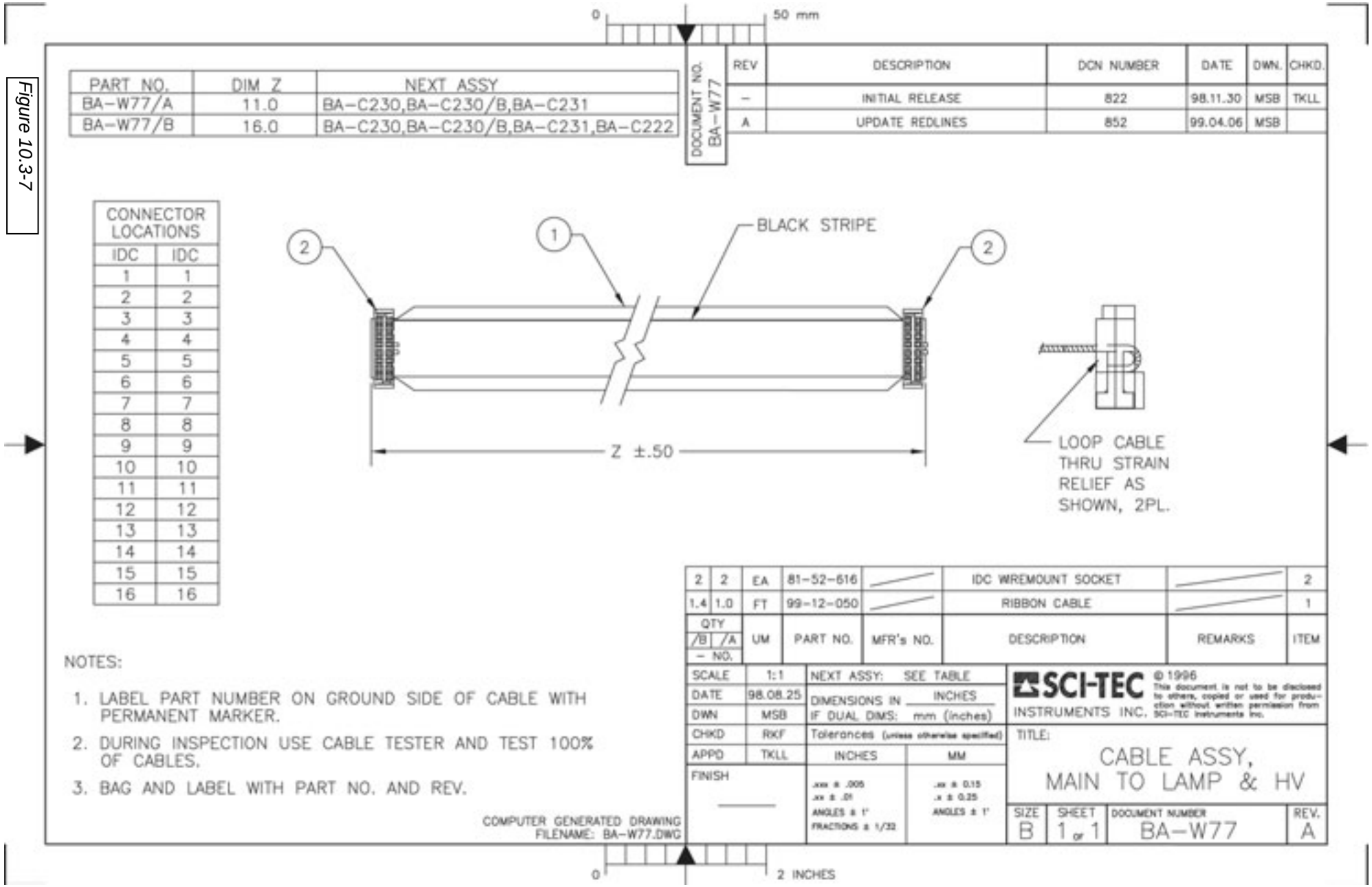
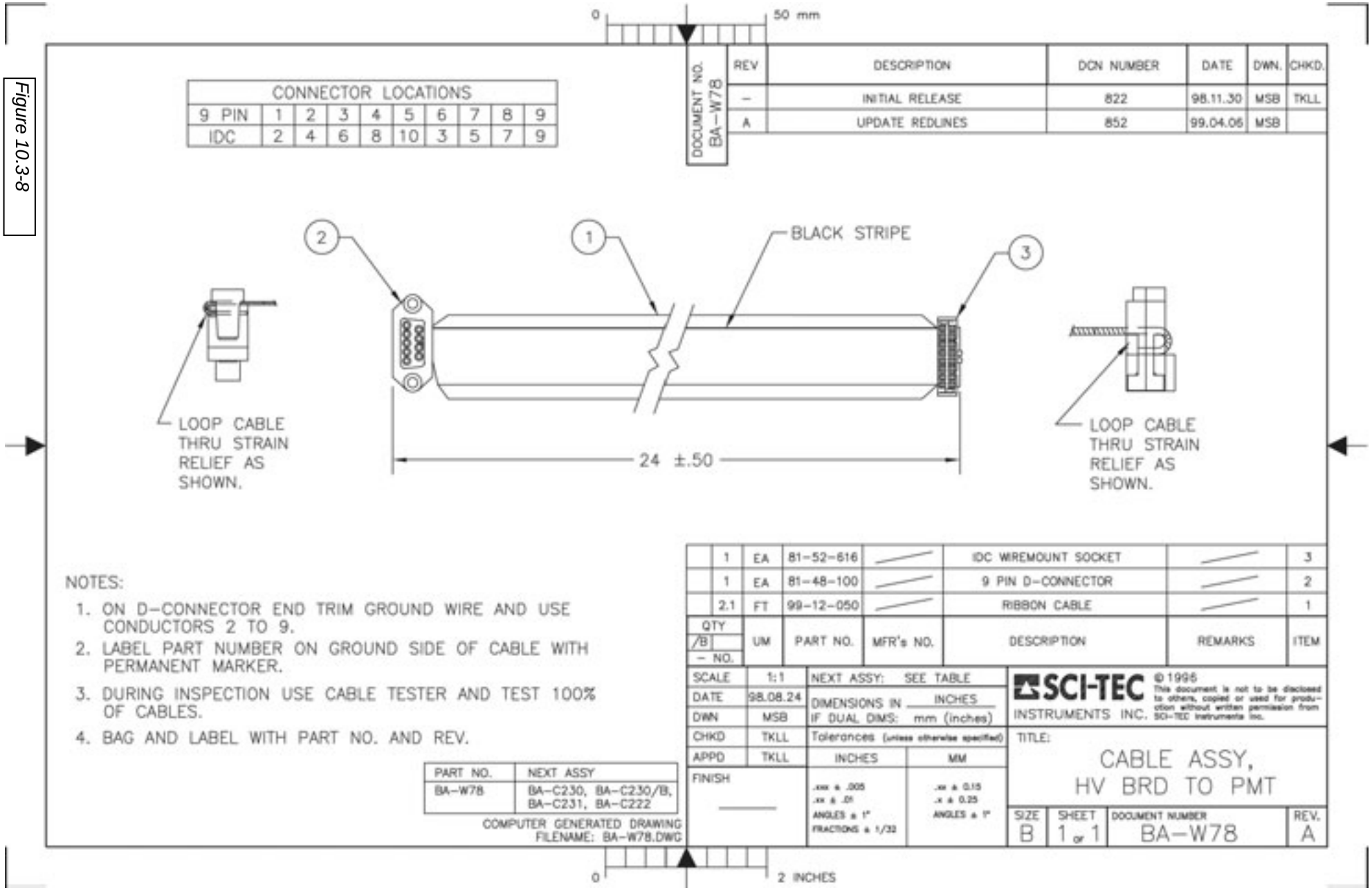
TITLE: CABLE ASSY, MOTOR CONNECTORS
SIZE B | SHEET 1 of 1 | DOCUMENT NUMBER BA-W76 | REV. A
0
2 INCHES

Figure 10.3-7


0
50 mm
DOCUMENT NO. BA-W77
REV | DESCRIPTION | DCN NUMBER | DATE | DWN. | CHKD.
– | INITIAL RELEASE | 822 | 98.11.30 | MSB | TKLL
A | UPDATE REDLINES | 852 | 99.04.06 | MSB |
PART NO. | DIM Z | NEXT ASSY
BA-W77/A | 11.0 | BA-C230,BA-C230/B,BA-C231
BA-W77/B | 16.0 | BA-C230,BA-C230/B,BA-C231,BA-C222
CONNECTOR LOCATIONS
IDC | IDC
1 | 1
2 | 2
3 | 3
4 | 4
5 | 5
6 | 6
7 | 7
8 | 8
9 | 9
10 | 10
11 | 11
12 | 12
13 | 13
14 | 14
15 | 15
16 | 16
2
1
BLACK STRIPE
2
Z ±.50
LOOP CABLE THRU STRAIN RELIEF AS SHOWN, 2PL.
NOTES:
1. LABEL PART NUMBER ON GROUND SIDE OF CABLE WITH PERMANENT MARKER.
2. DURING INSPECTION USE CABLE TESTER AND TEST 100% OF CABLES.
3. BAG AND LABEL WITH PART NO. AND REV.
COMPUTER GENERATED DRAWING
FILENAME: BA-W77.DWG
QTY /B /A – NO. | UM | PART NO. | MFR's NO. | DESCRIPTION | REMARKS | ITEM
2 2 | EA | 81-52-616 | | IDC WREMOUNT SOCKET | | 2
1.4 1.0 | FT | 99-12-050 | | RIBBON CABLE | | 1
SCALE 1:1
DATE 98.08.25
DWN MSB
CHKD RKF
APPD TKLL
NEXT ASSY: SEE TABLE
DIMENSIONS IN INCHES
IF DUAL DIMS: mm (inches)
Tolerances (unless otherwise specified)
INCHES: .xxx ± .005, .xx ± .01, ANGLES ± 1°, FRACTIONS ± 1/32
MM: .xx ± 0.15, .x ± 0.25, ANGLES ± 1°
FINISH
SCI-TEC INSTRUMENTS INC.
© 1996 This document is not to be disclosed to others, copied or used for production without written permission from SCI-TEC Instruments Inc.
TITLE: CABLE ASSY, MAIN TO LAMP & HV
SIZE B | SHEET 1 OF 1 | DOCUMENT NUMBER BA-W77 | REV. A
0
2 INCHES


0
50 mm
CONNECTOR LOCATIONS
9 PIN 1 2 3 4 5 6 7 8 9
IDC 2 4 6 8 10 3 5 7 9
DOCUMENT NO. BA-W78
REV | DESCRIPTION | DCN NUMBER | DATE | DWN. | CHKD.
– | INITIAL RELEASE | 822 | 98.11.30 | MSB | TKLL
A | UPDATE REDLINES | 852 | 99.04.06 | MSB |
2
1
BLACK STRIPE
3
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
24 ±.50
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
NOTES:
1. ON D-CONNECTOR END TRIM GROUND WIRE AND USE CONDUCTORS 2 TO 9.
2. LABEL PART NUMBER ON GROUND SIDE OF CABLE WITH PERMANENT MARKER.
3. DURING INSPECTION USE CABLE TESTER AND TEST 100% OF CABLES.
4. BAG AND LABEL WITH PART NO. AND REV.
PART NO. | NEXT ASSY
BA-W78 | BA-C230, BA-C230/B, BA-C231, BA-C222
COMPUTER GENERATED DRAWING
FILENAME: BA-W78.DWG
1 EA 81-52-616 IDC WIREMOUNT SOCKET 3
1 EA 81-48-100 9 PIN D-CONNECTOR 2
2.1 FT 99-12-050 RIBBON CABLE 1
QTY /B – NO. | UM | PART NO. | MFR's NO. | DESCRIPTION | REMARKS | ITEM
SCALE 1:1
DATE 98.08.24
DWN MSB
CHKD TKLL
APPD TKLL
FINISH
NEXT ASSY: SEE TABLE
DIMENSIONS IN INCHES
IF DUAL DIMS: mm (inches)
Tolerances (unless otherwise specified)
INCHES: .xxx ± .005, .xx ± .01, ANGLES ± 1°, FRACTIONS ± 1/32
MM: .xx ± 0.15, .x ± 0.25, ANGLES ± 1°
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TITLE:
CABLE ASSY, HV BRD TO PMT
SIZE B | SHEET 1 of 1 | DOCUMENT NUMBER BA-W78 | REV. A
0
2 INCHES

Figure 10.3-8

BREWER REFERENCE DOCUMENTATION

Section 10.4 Electronics Schematics	**Figure**
- Main Electronics Board Schematics BS-E123	10.4-1
- Lamp Control Electronics board Schematic BS-E129	10.4-2
- High Voltage Control Schematic BS-E131	10.4-3
- High Voltage supply Data Sheet	10.4-4
- Humidity Sensor Data Sheet	10.4-5
- Humidity Sensor Board Schematic (option) BS-E131	10.4.6
- Heater Control Board Schematic (option) 12505290	10.4-7

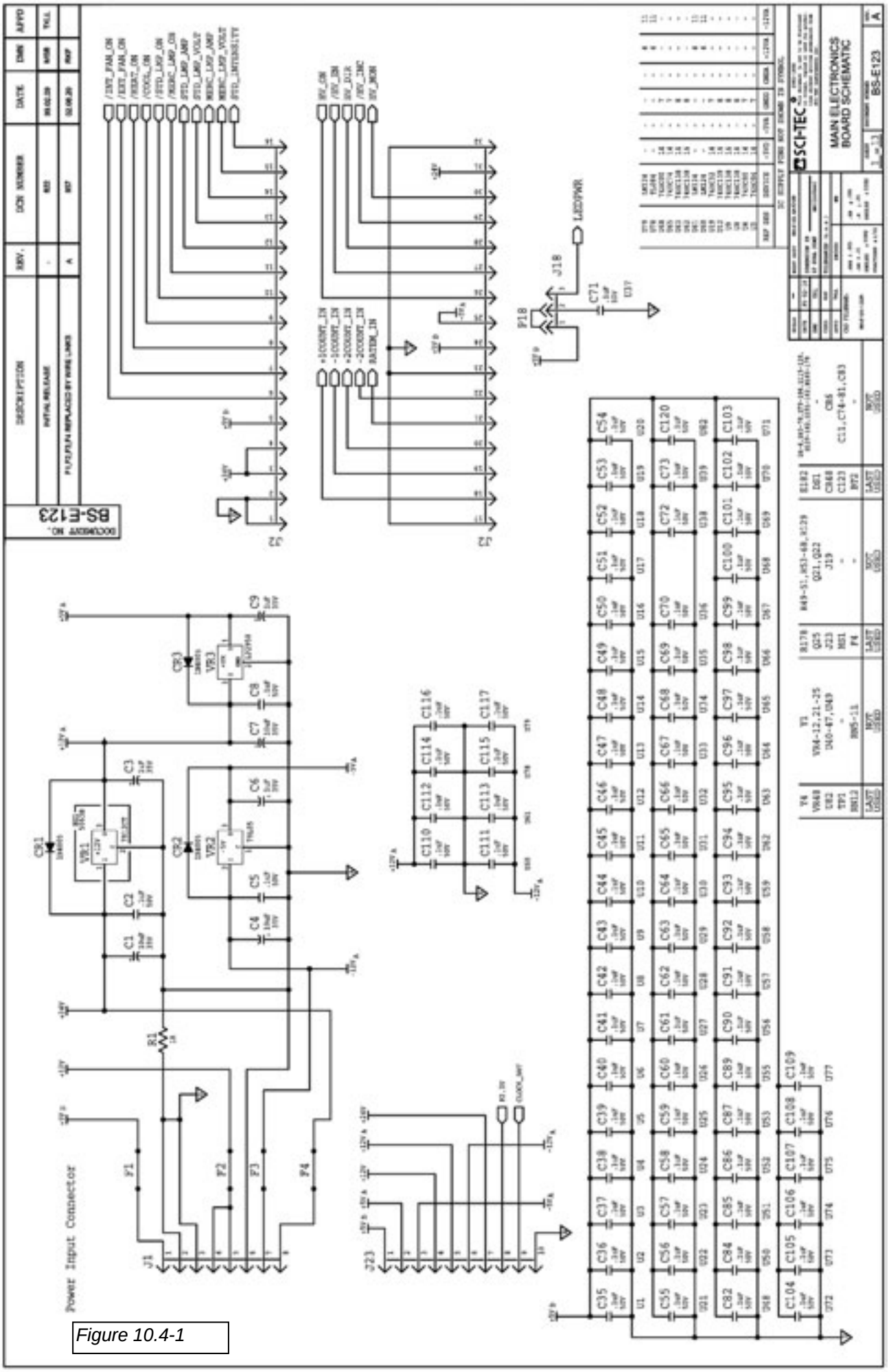
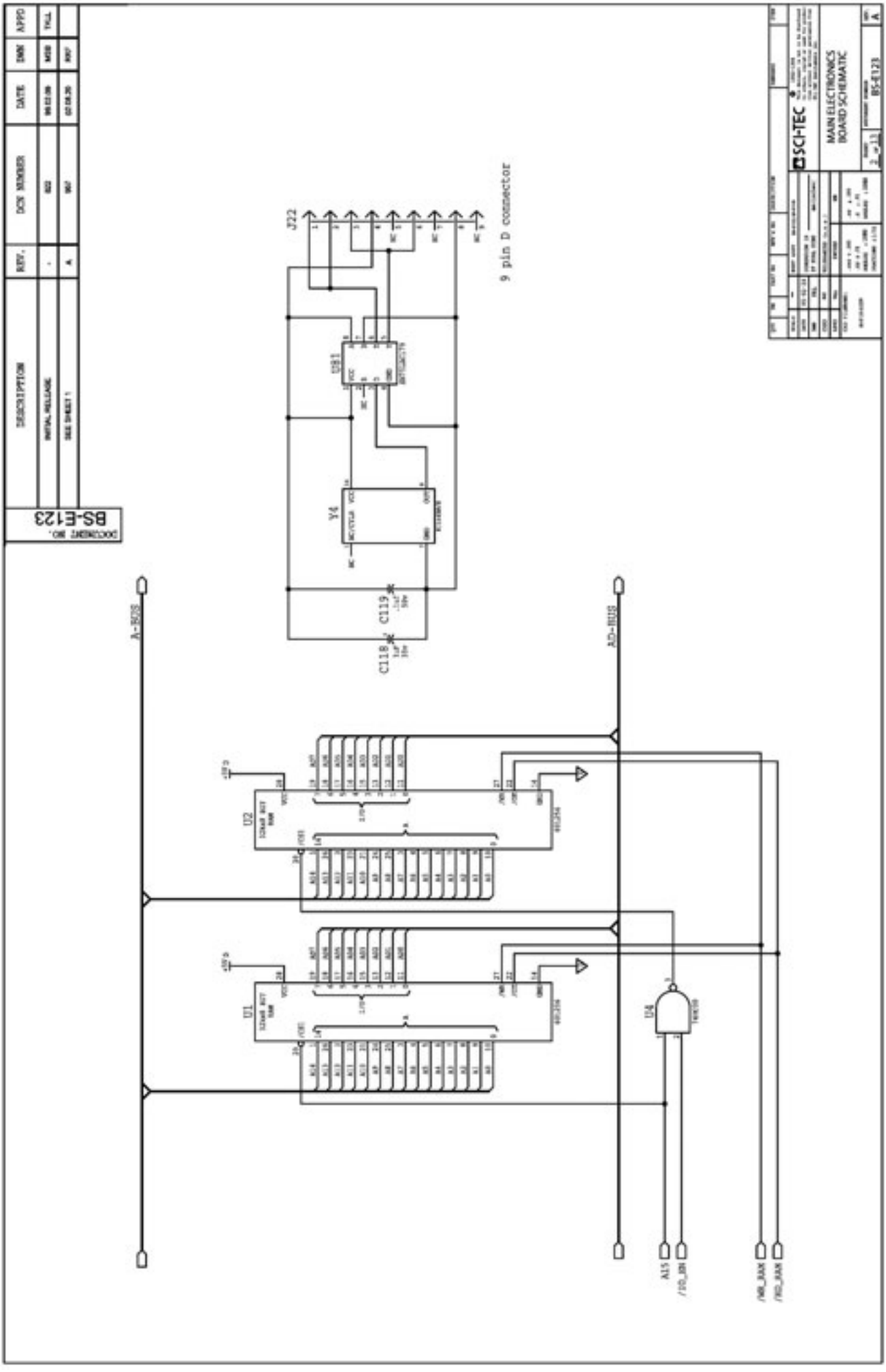

MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
Power Input Connector

Figure 10.4-1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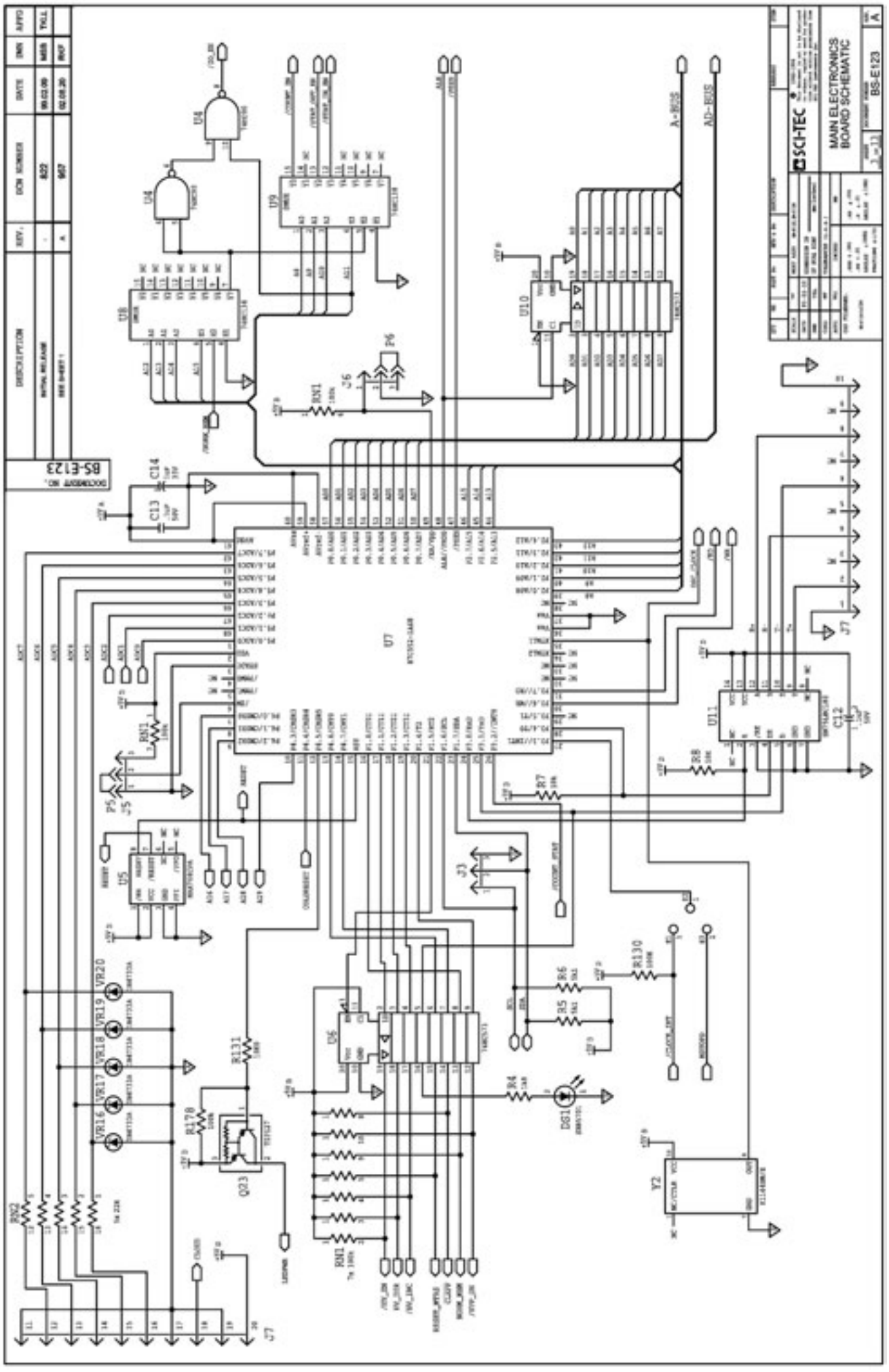
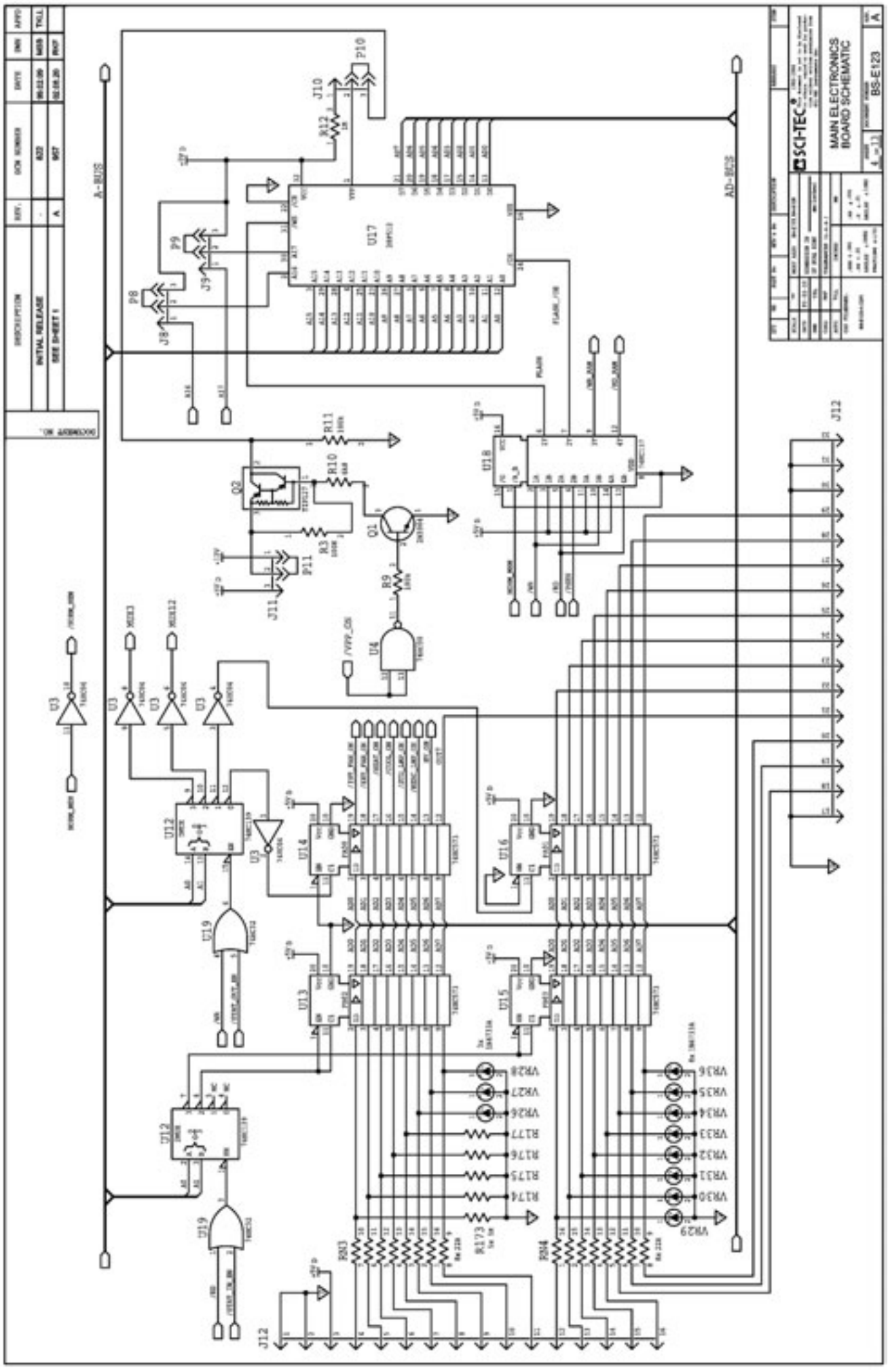
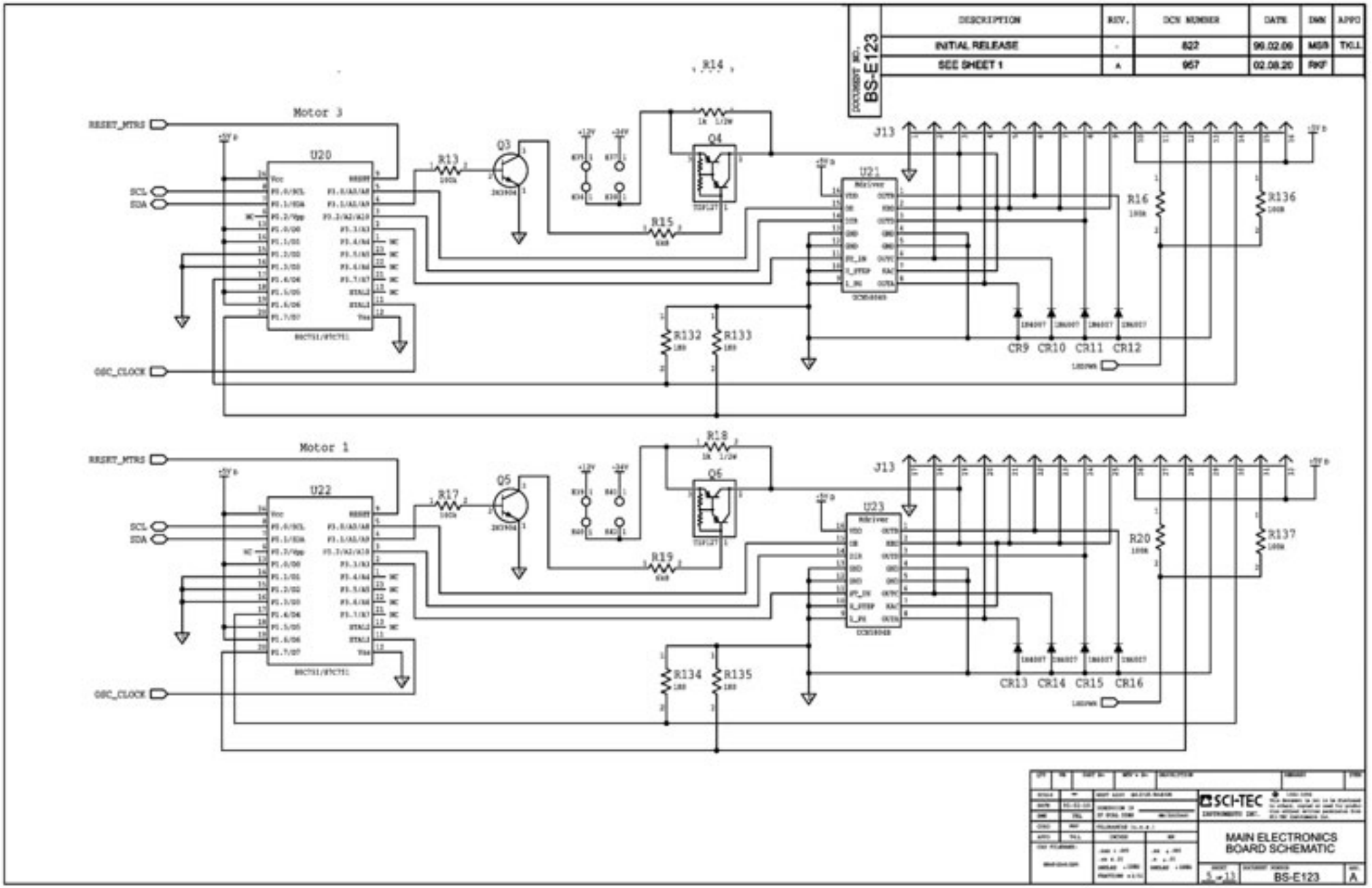
BS-E123
DESCRIPTION
INITIAL RELEASE
SEE SHEET 1
REV.
DCN NUMBER
DATE
DWN
APPD
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
9 pin D connector
J22
Y4
C119
C118
A-BUS
AD-BUS
U2
U1
U4
A15
/IO_RM
/MR_AAK
/RD_AAK


MAIN ELECTRONICS
BOARD SCHEMATIC
SCI-TEC
BS-E123
A-BUS
AD-BUS
U7
U10
U11
U9
U8
U4
U5
U6
Y2
Q23
DS1
VR16
VR17
VR18
VR19
VR20
R131
R178
R130
R6
R5
R4
R8
R7
RN1
RN2
C14
C13
C12
P4
P5
P6
J3
J5
J7


MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
SCI-TEC
A-BUS
AD-BUS
INITIAL RELEASE
SEE SHEET 1
DESCRIPTION
U17
U18
U12
U13
U14
U15
U16
U19
U4
U3
Q1
Q2
J10
J11
J12
P8
P9
P10
P11
R10
R11
R12
R3
R9
R173
R174
R175
R176
R177
R303
R304
VR26
VR27
VR28
VR29
VR30
VR31
VR32
VR33
VR34
VR35
VR36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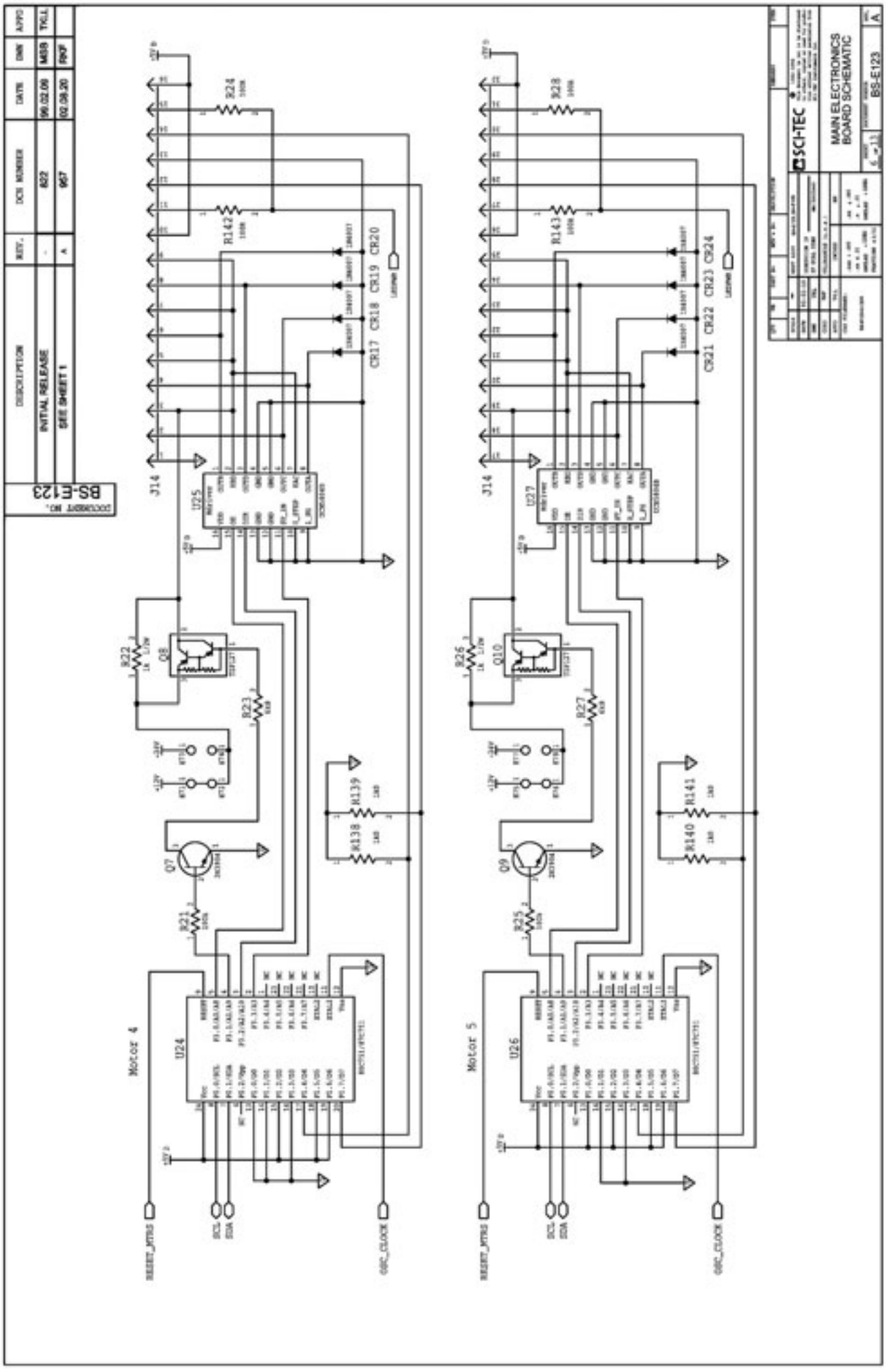
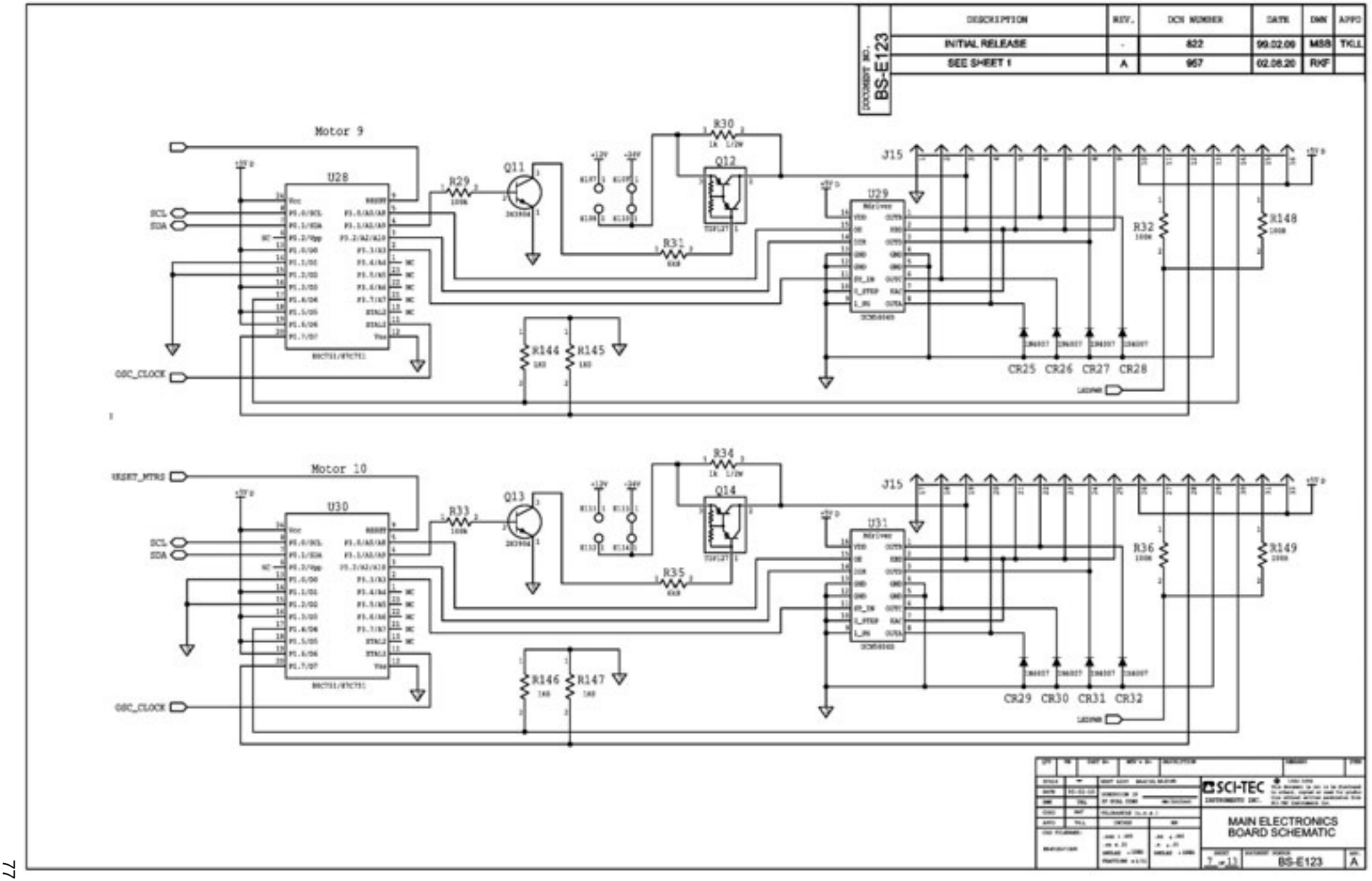
REV.
DCN NUMBER
DATE
DWN
APPD
INITIAL RELEASE
-
822
99.02.09
MSB
TKLL
SEE SHEET 1
A
957
02.08.20
RKF
Motor 3
Motor 1
RESET_MTRS
SCL
SDA
OSC_CLOCK
U20
U21
U22
U23
J13
R13
R14
R15
R16
R17
R18
R19
R20
R132
R133
R134
R135
R136
R137
Q3
Q4
Q5
Q6
CR9
CR10
CR11
CR12
CR13
CR14
CR15
CR16
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
A


MAIN ELECTRONICS BOARD SCHEMATIC
SCI-TEC
BS-E123
Motor 4
Motor 5
R24
R142
R143
R28
R22
R23
R26
R27
R21
R25
R139
R138
R141
R140
Q8
Q10
Q7
Q9
U24
U26
U25
U27
J14
CR17 CR18 CR19 CR20
CR21 CR22 CR23 CR24
SCL
SDA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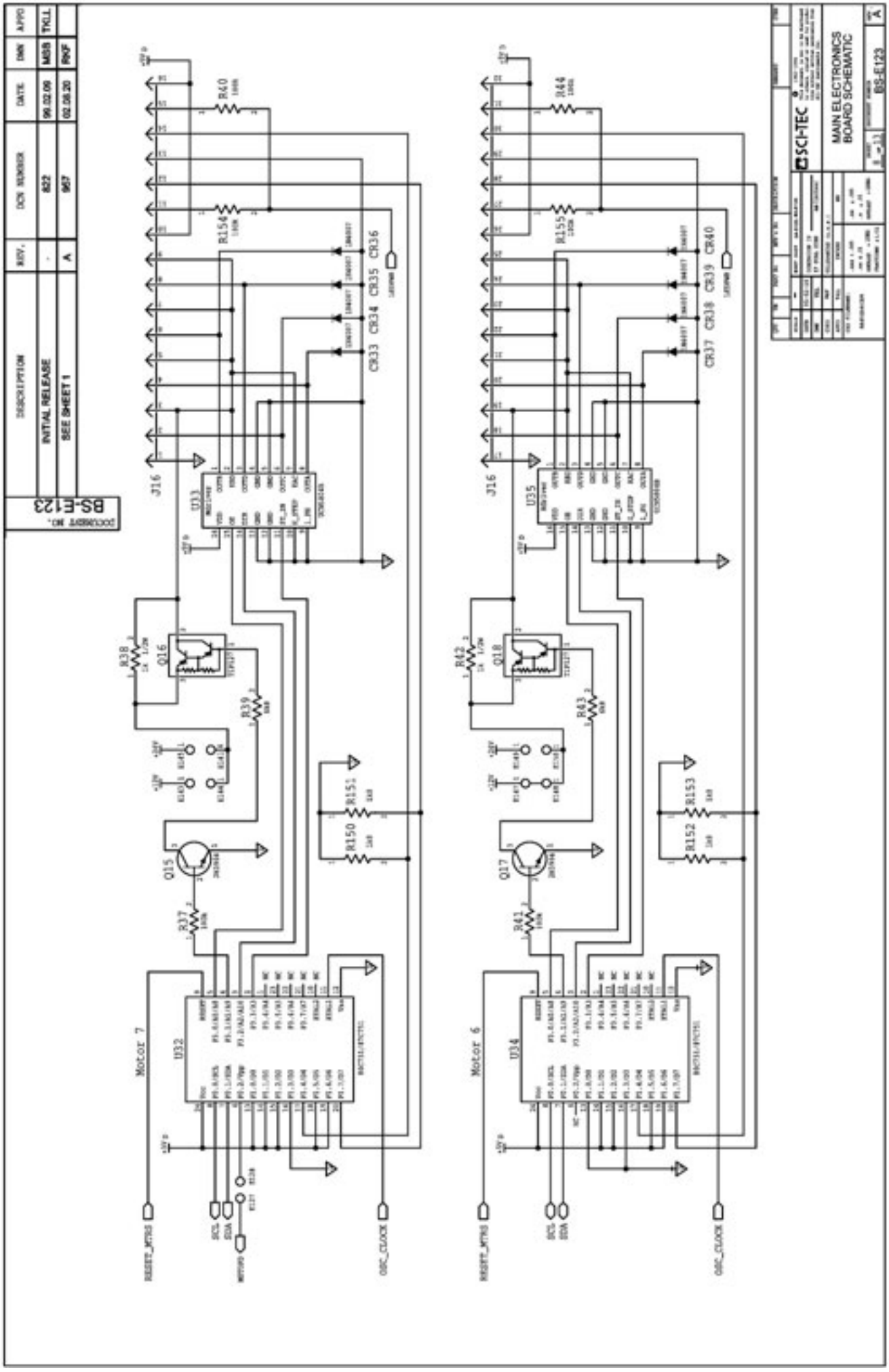
APPD
INITIAL RELEASE
-
822
99.02.09
MSB
TKLL
SEE SHEET 1
A
967
02.06.20
RKF
Motor 9
Motor 10
U28
U29
U30
U31
Q11
Q12
Q13
Q14
R29
R30
R31
R32
R33
R34
R35
R36
R144
R145
R146
R147
R148
R149
J15
SCL
SDA
GDC_CLOCK
CR25 CR26 CR27 CR28
CR29 CR30 CR31 CR32
SCI-TEC
INSTRUMENTS INC.
MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
A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REV.
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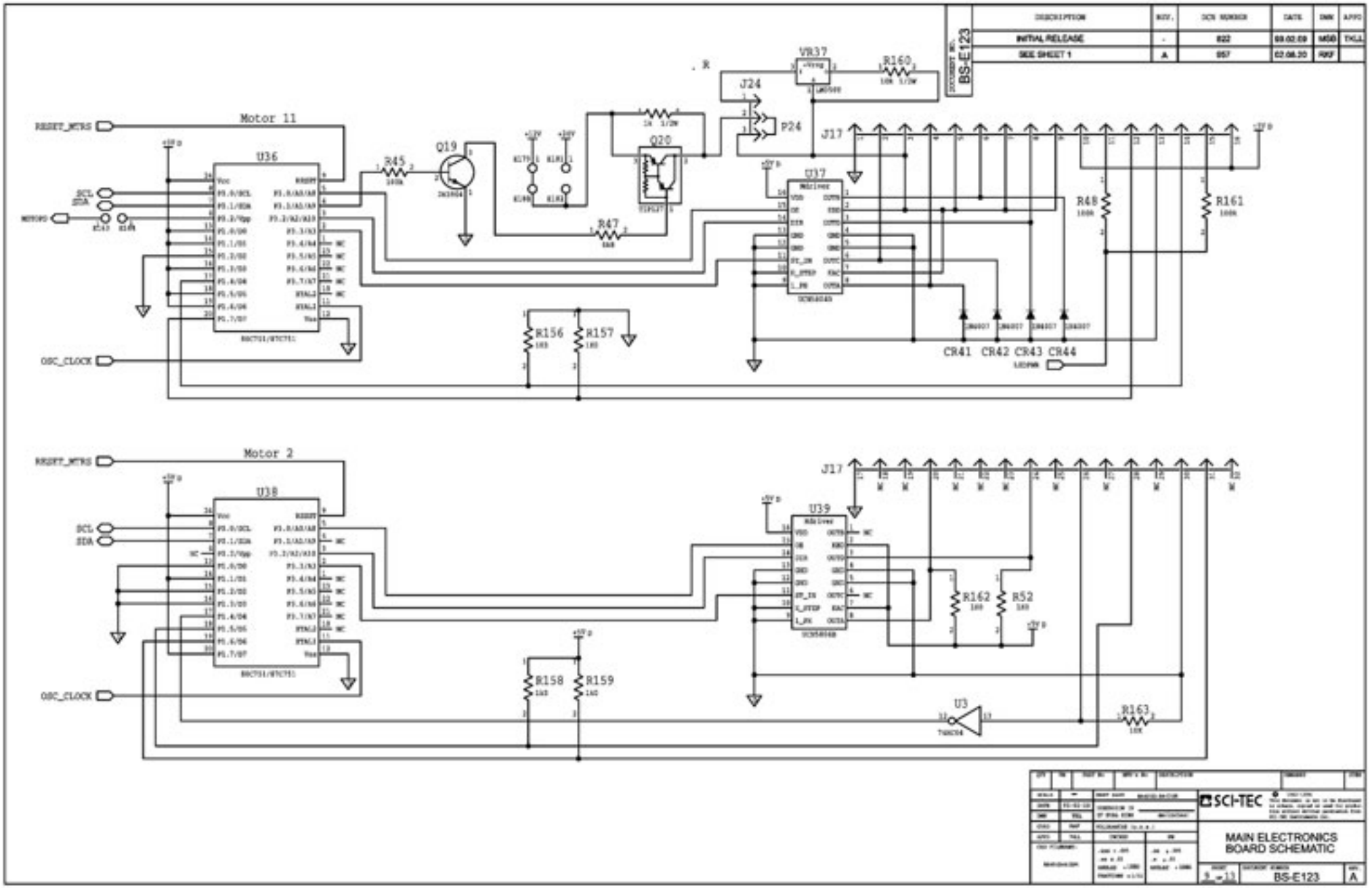
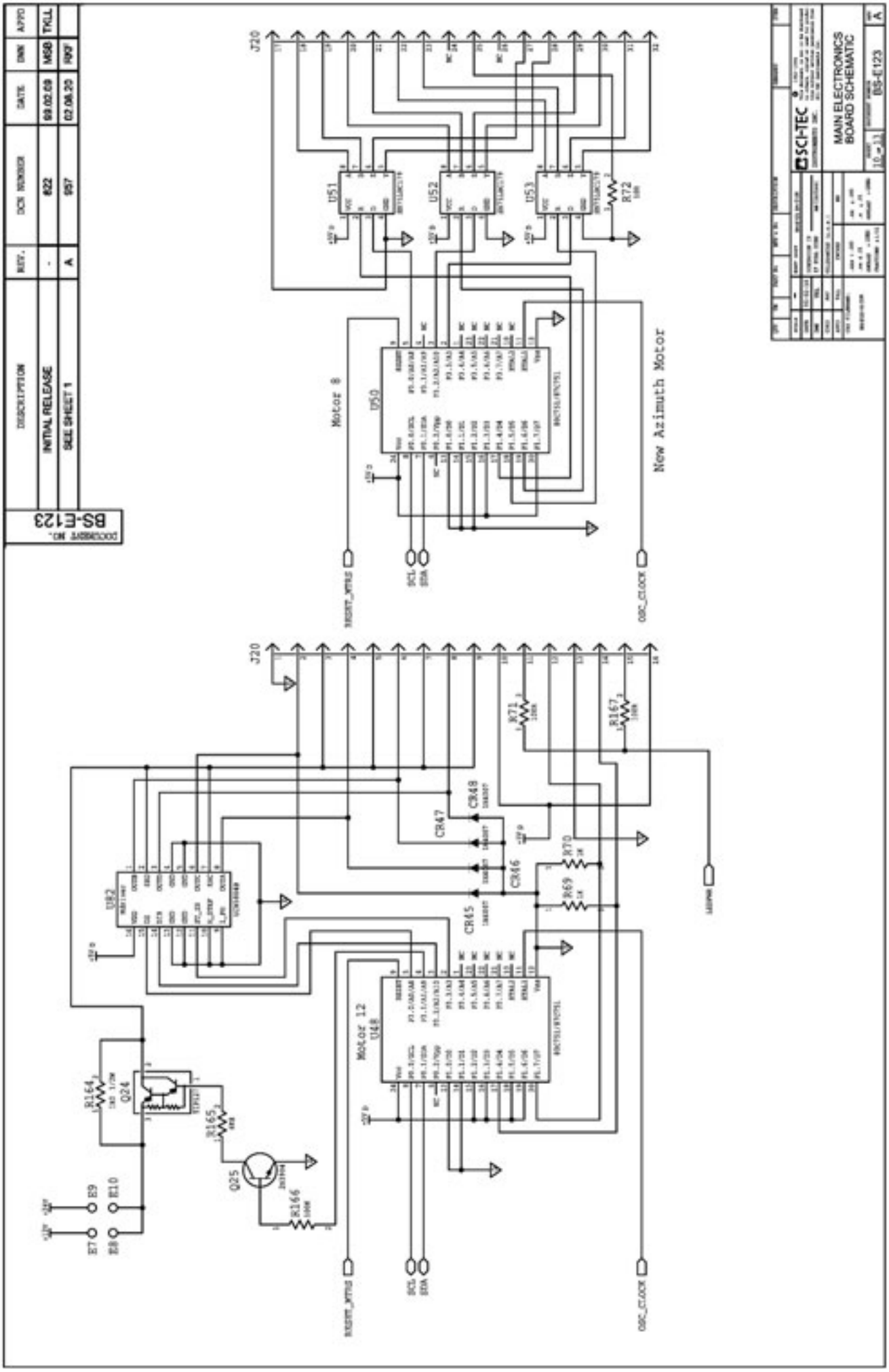
DCN NUMBER
822
957
DATE
99.02.09
02.08.20
DWN
MBB
RKF
APPD
TKLL
DOCUMENT NO.
BS-E123
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
SIZE
A
BS-E123
SHEET
1 of 1
Motor 7
Motor 6
J16
U33
U35
U32
U34
Q15
Q16
Q17
Q18
R37
R38
R39
R41
R42
R43
R150
R151
R152
R153
R154
R155
CR33
CR34
CR35
CR36
CR37
CR38
CR39
CR40
INDEX_MTR0
SCL
SDA
OSC_CLOCK


Motor 11
Motor 2
RESET_MTRS
MOTORS
SCL
SDA
OSC_CLOCK
U36
U37
U38
U39
Q19
Q20
R45
R47
R48
R52
R156
R157
R158
R159
R160
R161
R162
R163
VR37
J24
P24
J17
CR41
CR42
CR43
CR44
U3
BS-E123
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC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DCN NUMBER
DATE
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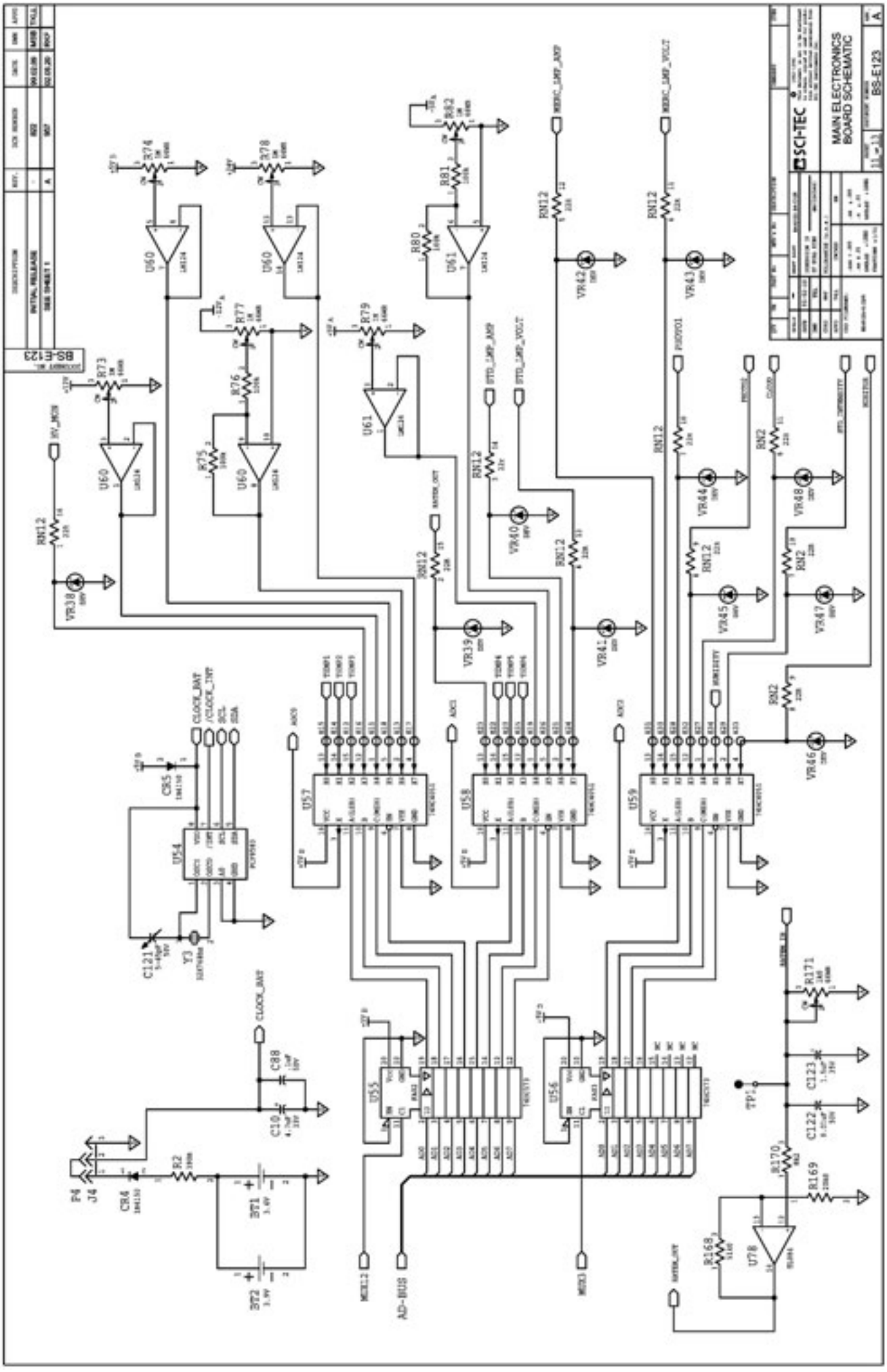
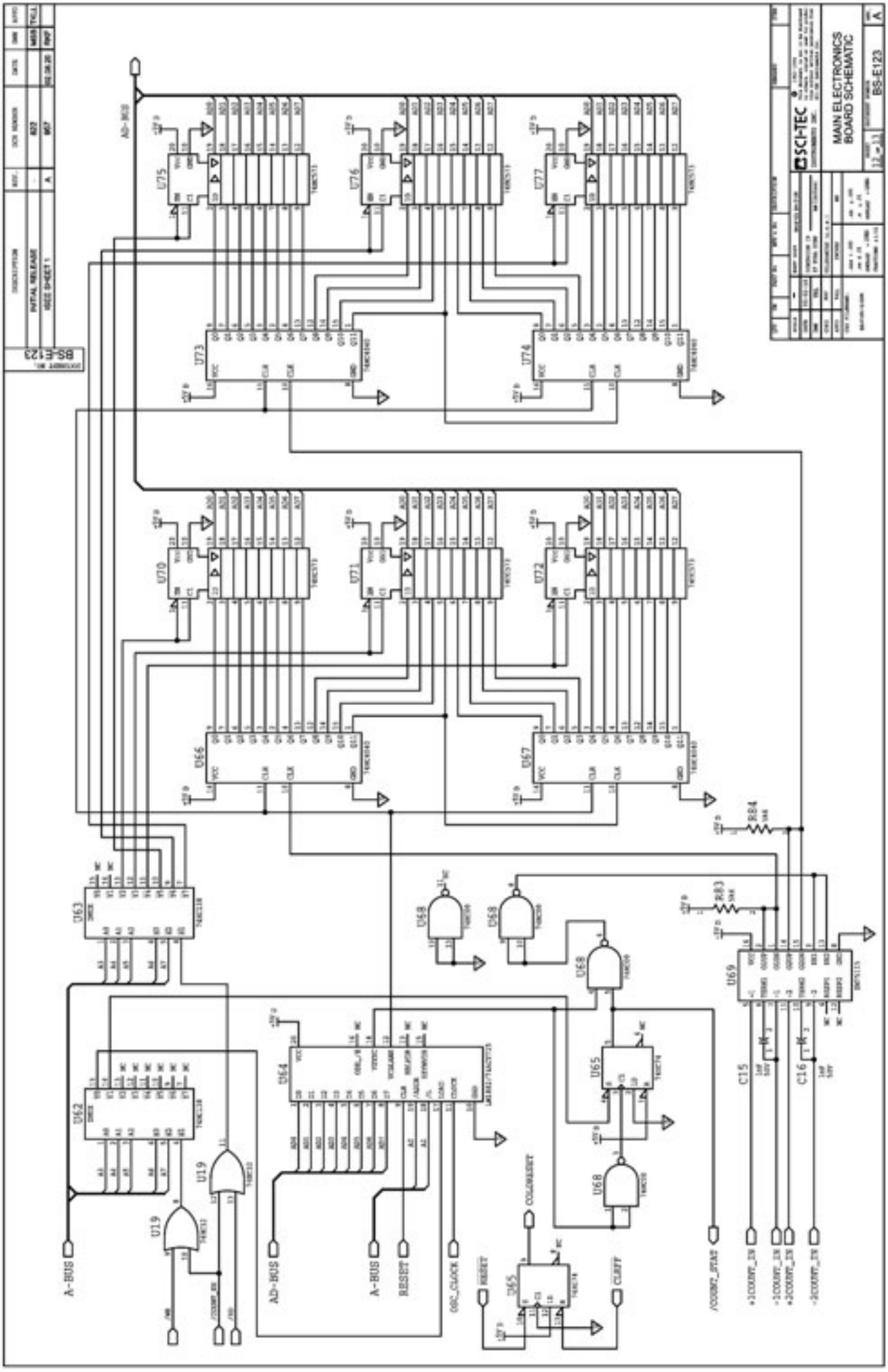
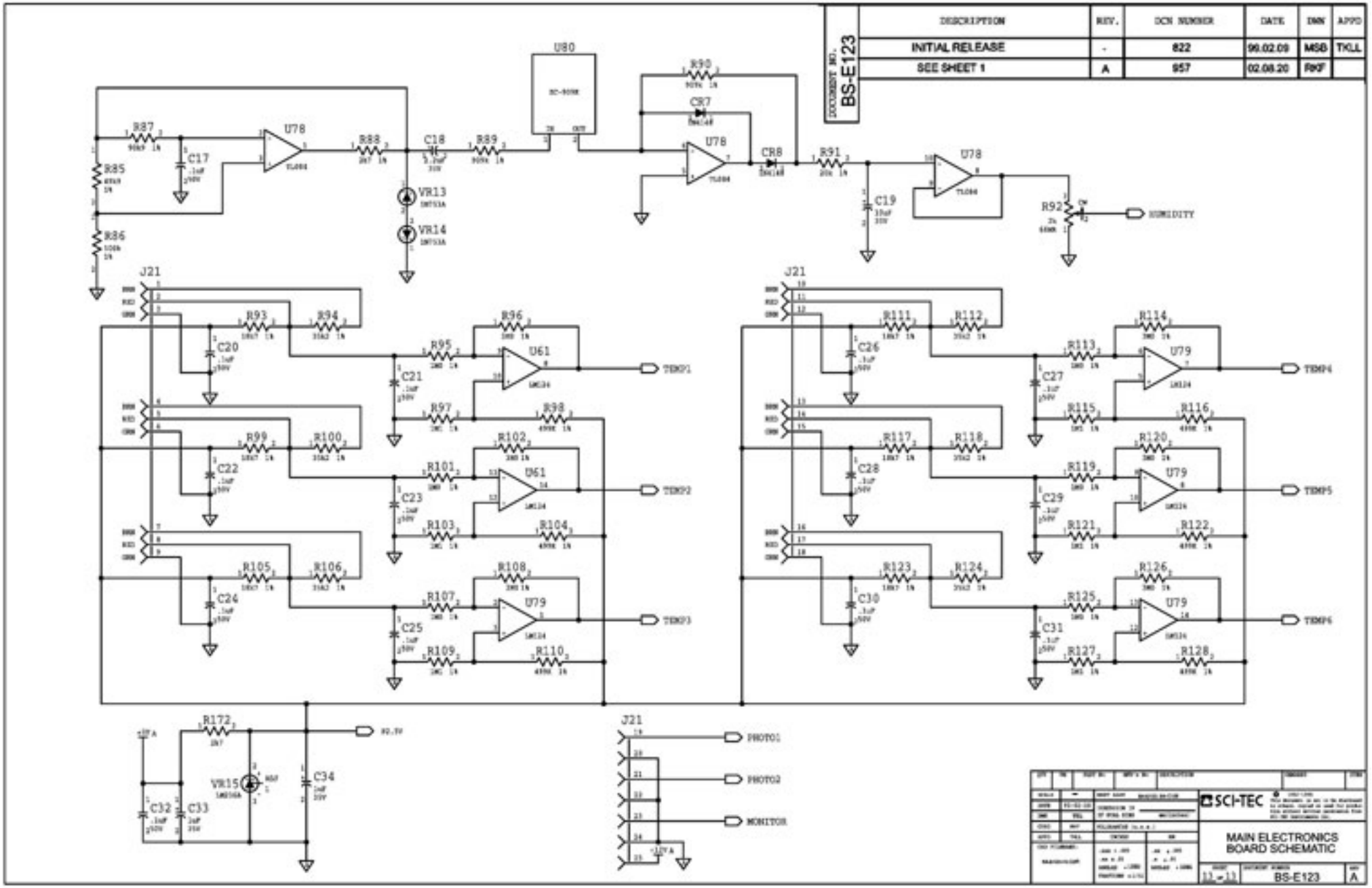
APPD
INITIAL RELEASE
-
#22
99.02.09
MSB
TKLL
SEE SHEET 1
A
957
02.08.20
RPF
DOCUMENT NO.
BS-E123
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
A
J20
U51
U52
U53
R72
U50
Motor 8
New Azimuth Motor
SCL
SDA
R71
R167
C847
C848
C846
C845
R70
R69
U48
Motor 12
R164
Q24
R165
Q25
R166
E9
E10
E7
E8


SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
INITIAL RELEASE
BS-E123
U60
U61
U57
U58
U59
U54
U55
U56
U78
RN12
RN2
VR38
VR39
VR40
VR41
VR42
VR43
VR44
VR45
VR46
VR47
VR48
R73
R74
R75
R76
R77
R78
R79
R80
R81
R82
R168
R169
R170
R171
C85
C88
C10
C121
C122
C123
Y3
J4
P4
R2
BT1
BT2
TP1
CLOCK_BAT
/CLOCK_INT
SCL
SDA
AD-BUS
MCB12
MCB3


MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
SCI-TEC
A-BUS
AD-BUS
RESET
CLOCK
CLEAR
/COUNT_STAT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INITIAL RELEASE | - | 822 | 96.02.09 | MSB | TKLL
SEE SHEET 1 | A | 957 | 02.08.20 | RKF |
U80
R90
CR7
U78
R87
C17
R85
R86
R88
C18
R89
VR13
VR14
CR8
R91
C19
R92
HUMIDITY
J21
R93
R94
C20
R95
R96
U61
TEMP1
C21
R97
R98
R99
R100
C22
R101
R102
U61
TEMP2
C23
R103
R104
R105
R106
C24
R107
R108
U79
TEMP3
C25
R109
R110
R111
R112
C26
R113
R114
U79
TEMP4
C27
R115
R116
R117
R118
C28
R119
R120
U79
TEMP5
C29
R121
R122
R123
R124
C30
R125
R126
U79
TEMP6
C31
R127
R128
R172
VR15
C32
C33
C34
+12V A
+2.5V
J21
PHOTO1
PHOTO2
MONITOR
+12V A
SCI-TEC
MAIN ELECTRONICS
BOARD SCHEMATIC
BS-E123
A

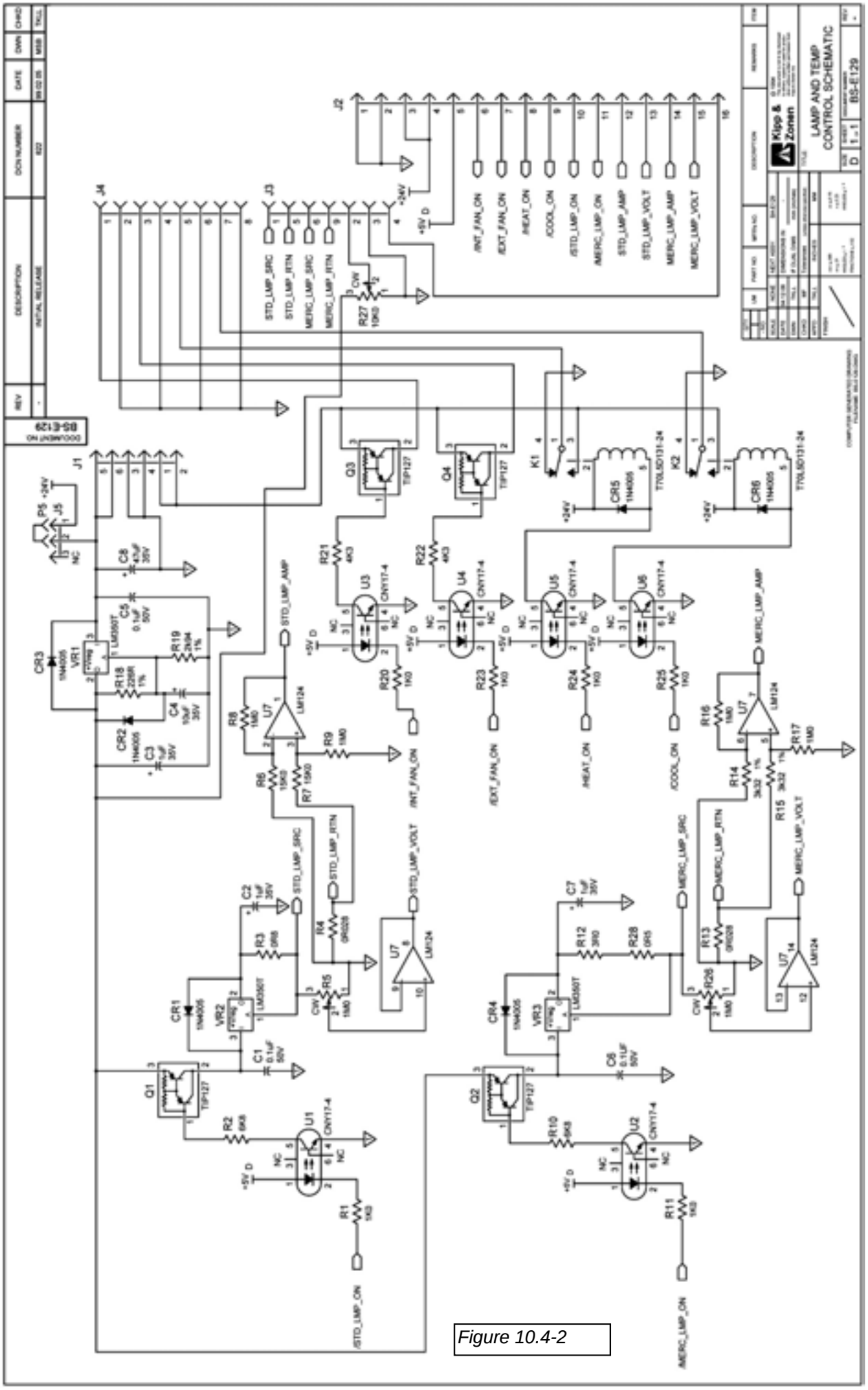

LAMP AND TEMP
CONTROL SCHEMATIC
Kipp & Zonen
BS-E129
DESCRIPTION
INITIAL RELEASE
DCN NUMBER
DATE
DWN
CHKD
J1
J2
J3
J4
J5
P5
K1
K2
Q1
Q2
Q3
Q4
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
C1
C2
C3
C4
C5
C6
C7
C8
CR1
CR2
CR3
CR4
CR5
CR6
VR1
VR2
VR3
U1
U2
U3
U4
U5
U6
U7
TIP127
CNY17-4
LM124
LM350T
1N4005
T70LS0131-24
+24V
+5V D
STD_LMP_SRC
STD_LMP_RTN
MERC_LMP_SRC
MERC_LMP_RTN
INT_FAN_ON
EXT_FAN_ON
HEAT_ON
COOL_ON
STD_LMP_ON
MERC_LMP_ON
STD_LMP_AMP
STD_LMP_VOLT
MERC_LMP_AMP
MERC_LMP_VOLT
CW

Figure 10.4-2

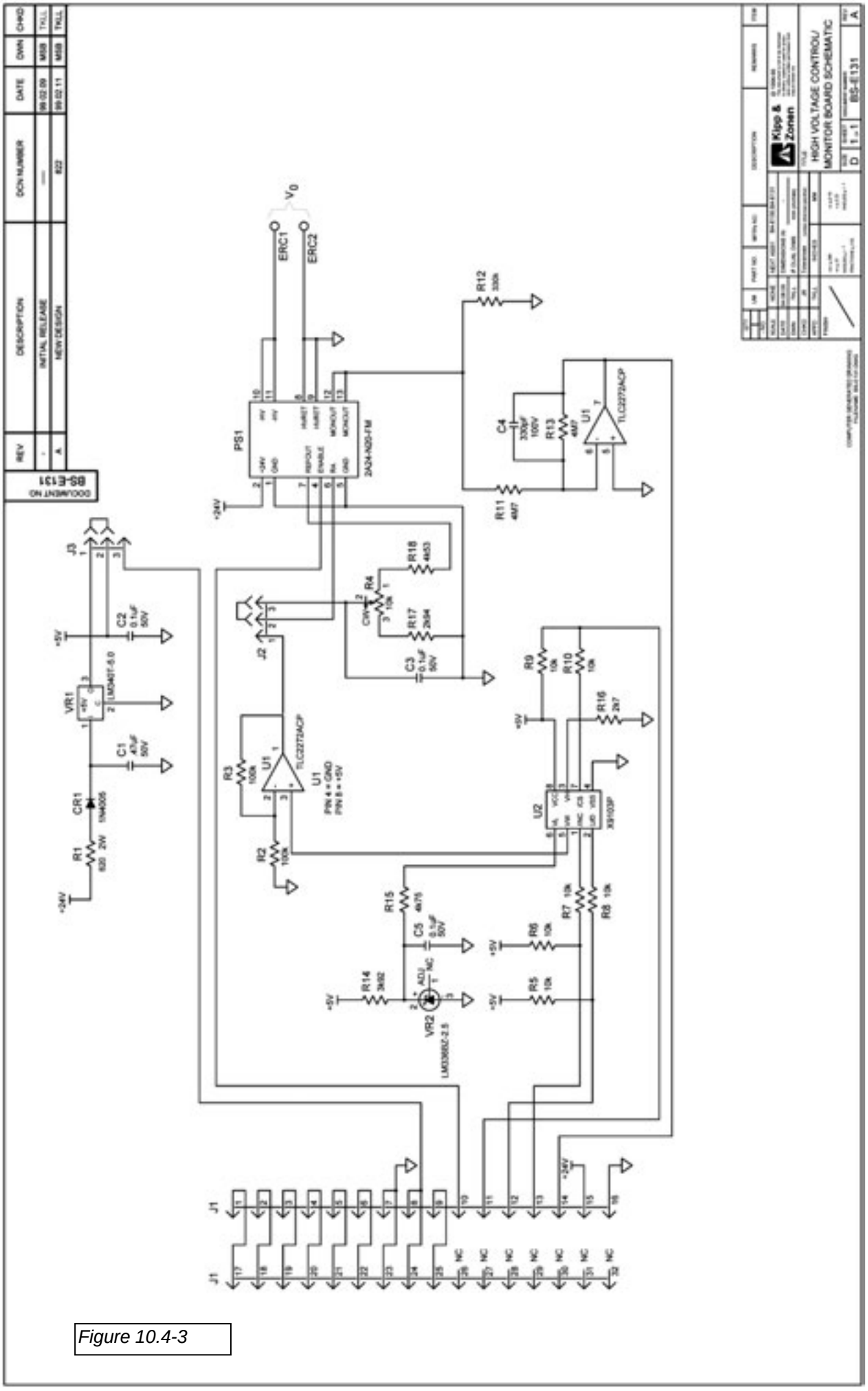

HIGH VOLTAGE CONTROL
MONITOR BOARD SCHEMATIC
Kipp & Zonen
85-E131
INITIAL RELEASE
NEW DESIGN
PS1
2A24-N05-FM
U1
TLC2272ACP
U2
X9103P
VR1
LM340T-5.0
VR2
LM336BZ-2.5
CR1
1N4005
J1
J2
J3
ERC1
ERC2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
C1
C2
C3
C4
C5
+5V
+24V
NC

Figure 10.4-3

"F" SERIES

HIGH VOLTAGE POWER SUPPLY ACCESSORY

- Output Ripple Filter
- Output Test Point
- Optional Flying Lead
- Mates with "A" Series Power Supplies

GENERAL INFORMATION:

The "F" Series of Ripple Stripper™ Output Filters provide significant ripple reduction, While adding only 4000 pF of output capacitance and increasing output impedance by < 650 ohms, output ripple is reduced > 100 time's! Also included is an Output Test Point and an Output Current Moinitor feature. A High Voltage Shielded output cable is available as an optional feature.

HIGH VOLTAGE OUTPUT FILTER:

Strips the output ripple on Mu-Metal Shielded "A" Series High Voltage Power Supplies down to :

2A12	2Kv	4WATT	< 0.001%Vp-p
2A24	2Kv	20WATT	< 0.002%Vp-p
4A12	4Kv	4WATT	< 0.0005%Vp-p
4A24	4Kv	20WATT	< 0.0015%Vp-p
6A12	6Kv	4WATT	< 0.0015%Vp-p
6A24	6Kv	20WATT	< 0.0015%Vp-p

HIGH VOLTAGE OUTPUT:

Square .025" pins are used for high voltage output and high voltage return. These pins can be used for PCB mounting or direct wiring. An optional High Voltage Output Flying Lead is available.

HIGH VOLTAGE TEST POINT:

A 100 megohm divider provides a 100:1 test point output on a 2 pin header. This test point has an output impedance of 1.11 megohm and is calibrated for use with a 10 megohm input impedance meter. Overall accuracy is ± 2.5% with a temperature coefficient of ± 200 ppm per °C.

For applications requiring a different scale factor, such as a DAC compatible design, an external impedance may be added in parallel with the output.

OUTPUT CURRENT MONITOR:

The "F" Series have a feature where the output current of the high voltage multiplier can be monitored by reading the voltage appearing between Output Monitor pin 3 and Signal Ground pin 5. Detailed information is described on applications note "AP-13".

SHIELDING:

All models are available with optional wrap-around Mu-Metal Shielding. This shielding attenuates magnetic and electrostatic emissions, while shielding ripple reduction circuitry from outside noise.

MECHANICAL:

The "F" Series accessories are designed to be added to the basic "A" module at the factory prior to encapsulation. The combined package is 6.35 In^3. As always, a Chassis Mount metal package is also available.

ENVIRONMENT:

The "F" Series meets all environmental specifications for temperature, shock & vibration as the "A" series.

ULTRAVOLT
C S 9002
RONKONKOMA, NY 11779
800-876-POWER
FAX 516-363-2423
"Making High Voltage Easier"

Figure 10.4-4

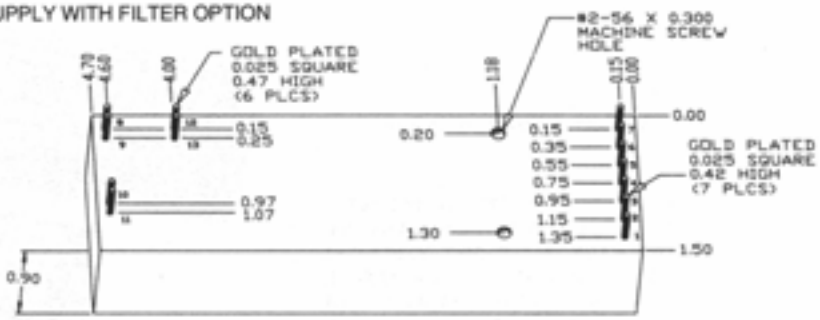
"F" SERIES

HIGH VOLTAGE POWER SUPPLY ACCESSORY

PLASTIC CASE: POWER SUPPLY WITH FILTER OPTION

CONSTRUCTION:
Epoxy Filled DAP Box
Certified to MIL-M-14F
SDG-F

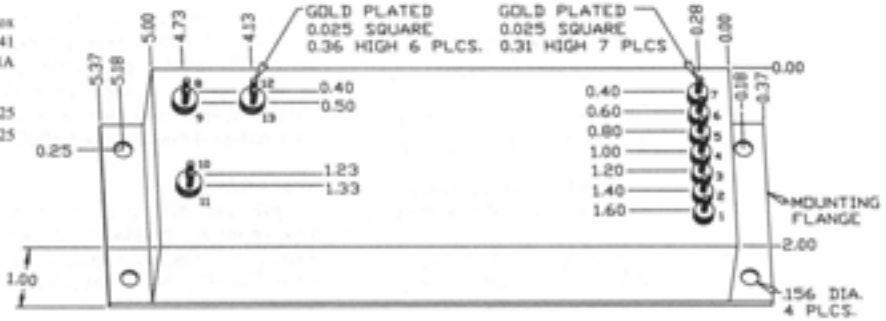
TOLERANCE:
Overall ± 0.050
Pin to Pin ± 0.025



METAL CASE: POWER SUPPLY WITH FILTER OPTION

CONSTRUCTION:
Epoxy Filled Aluminum Box
Chem Film per MIL-C-5541
Class 1A

TOLERANCE:
Overall ± 0.025
Pin to Pin ± 0.025



Connections

1 - Input PWR Return
2 - Positive PWR Input
3 - Output Current Monitor
4 - Enable
5 - Signal Return
6 - Remote Adjust
7 - Reference
8 & 9 - H.V. Return
10 & 11 - H.V. Output
12 & 13 - Output Test Point
All grounds joined internally. Power supply mounting points isolated from internal grounds by >100KΩ / .01uF 50V (Max)

Ordering Information

Case:	Plastic Case - Diallyl Phthalate	Std
	Aluminum Case	- C
Shield:	Mu Metal shield	- M

Example: 2A12 – P4 – F – C

- C — Option (Case)
- F — Ripple Stripper™ Filter

"Making High Voltage Easier"

CS 9002, Ronkonkoma, NY 11779

Humidity Sensors
Relative Humidity

HIH Series

FEATURES
- Linear voltage output vs %RH
- Laser trimmed interchangeability
- Low power design
- High accuracy
- Fast response time
- Stable, low drift performance
- Chemically resistant

TYPICAL APPLICATIONS
- Refrigeration
- Drying
- Meteorology
- Battery-powered systems
- OEM assemblies

GENERAL INFORMATION
The HIH-3605 monolithic IC (Integrated Circuit) humidity sensor is designed specifically for high volume OEM (Original Equipment Manufacturer) users. Direct input to a controller or other device is made possible by this sensor's linear voltage output. With a typical current draw of only 200 µA, the HIH-3605 is ideally suited for low drain, battery powered systems.

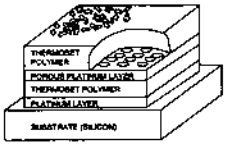
The HIH-3605 delivers instrumentation quality RH sensing performance in a low cost, solderable SIP (Single In-line Package). Available in two lead spacing configurations, the RH sensor is a laser trimmed thermoset polymer capacitive sensing element with on-chip integrated signal conditioning.

ORDER GUIDE

Catalog Listing	Description
HIH-3605-A	Integrated circuit humidity sensor, 0.100 in. lead pitch SIP
HIH-3605-A-CP	Integrated circuit humidity sensor, 0.100 in. lead pitch SIP with calibration and data printout
HIH-3605-B	Integrated circuit humidity sensor, 0.050 in. lead pitch SIP
HIH-3605-B-CP	Integrated circuit humidity sensor, 0.050 in. lead pitch SIP with calibration and data printout

NIST CALIBRATION
HIH-3605 sensors may be ordered with a NIST calibration and sensor specific data printout. Append "-CP" to the model number to order.

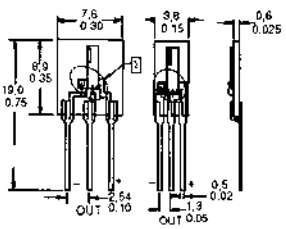
RH SENSOR CONSTRUCTION
Sensor construction consists of a planar capacitor with a second polymer layer to protect against dirt, dust, oils and other hazards.



CAUTION
PRODUCT DAMAGE
The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take normal ESD precautions when handling this product.

MOUNTING DIMENSIONS (for reference only)

HIH-3605-A HIH-3605-B



Humidity Sensors
Relative Humidity

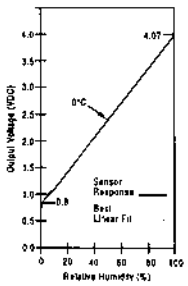
HIH Series

PERFORMANCE SPECIFICATIONS

Parameter	Conditions
RH Accuracy[1]	+2% RH, 0-100% RH non-condensing, 25°C, V_{supply} = 5 VDC
RH Interchangeability	±5% RH, 0-60% RH; ±8% @ 90% RH typical
RH Linearity	±0.5% RH typical
RH Hysteresis	±1.2% of RH span maximum
RH Repeatability	±0.5% RH
RH Response Time, 1/e	15 sec in slowly moving air at 25°C
RH Stability	±1% RH typical at 50% RH in 5 years
Power Requirements Voltage Supply Current Supply	 4 to 5.8 VDC, sensor calibrated at 5 VDC 200 µA at 5 VDC, 2 mA typical at 9 VDC
Voltage Output V_{supply} = 5 VDC Drive Limits	$V_{out} = V_{supply}$ (0.0062 (Sensor RH) +0.16), typical @ 25°C (Data printout provides a similar, but sensor specific, equation at 25°C.) 0.8 to 3.9 VDC output @ 25°C typical Push/pull symmetric, 50 µA typical, 20 µA minimum, 100 µA maximum
	Turn-on ±0.1 second
Temp. Compensation Effect @ 0% RH Effect @ 100% RH	True RH = (Sensor RH)/(1.083-.0012T), T in °F True RH = (Sensor RH)/(1.0546-0.002167), T in °C +0.007% RH/°C (negligible) −0.22% RH/°C (<1% RH effect typical in occupied space systems above 15°C (59°F))
Humidity Range Operating Storage	 0 to 100% RH, non-condensing [2] 0 to 90% RH, non-condensing
Temperature Range Operating Storage	 −40° to 85°C (−40° to 185°F) −51° to 125°C (−60° to 257°F)
Package[3]	Three pin solderable ceramic SIP
Handling	Static sensitive diode protected to 15 kV maximum

Notes:
1. Extended exposure to ≥90% RH causes a reversible shift of 3% RH.
2. This sensor is light sensitive. For best results, shield the sensor from bright light.

OUTPUT VOLTAGE VS RELATIVE HUMIDITY (at 0°C)



OUTPUT VOLTAGE VS RELATIVE HUMIDITY (at 0°C, 25°C, and 85°C)

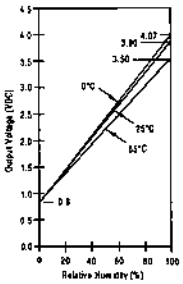
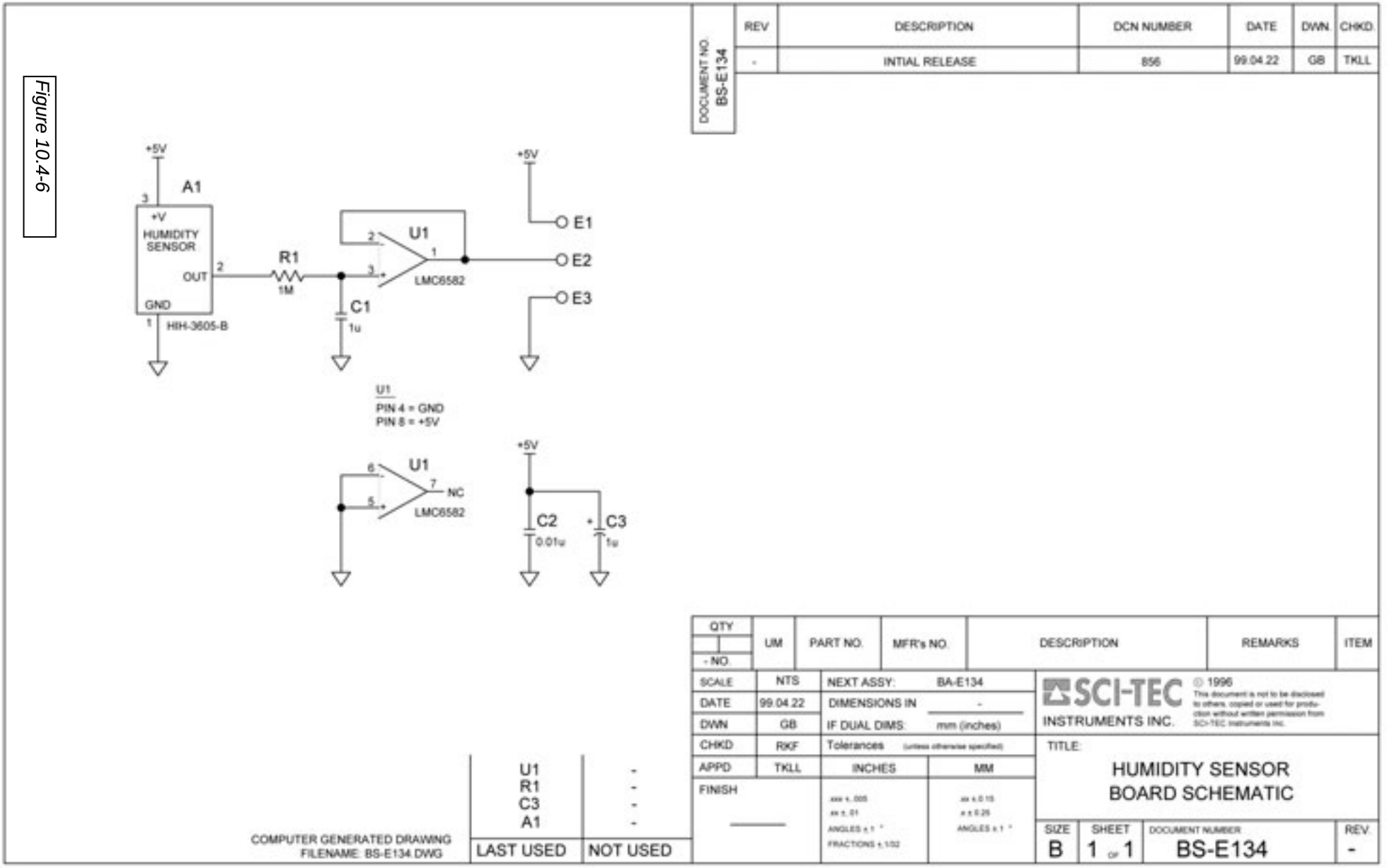


Figure 10.4-5

Figure 10.4-6


DOCUMENT NO. BS-E134
REV | DESCRIPTION | DCN NUMBER | DATE | DWN | CHKD
- | INTIAL RELEASE | 856 | 99.04.22 | GB | TKLL
+5V
A1
3
+V
HUMIDITY SENSOR
OUT
2
GND
1
HIH-3605-B
R1
1M
U1
2
3
1
LMC6582
C1
1u
+5V
E1
E2
E3
U1
PIN 4 = GND
PIN 8 = +5V
U1
6
5
7
NC
LMC6582
+5V
C2
0.01u
C3
1u
QTY
- NO.
U/M
PART NO.
MFR's NO.
DESCRIPTION
REMARKS
ITEM
SCALE NTS
DATE 99.04.22
DWN GB
CHKD RKF
APPD TKLL
NEXT ASSY: BA-E134
DIMENSIONS IN -
IF DUAL DIMS: mm (inches)
Tolerances (unless otherwise specified)
INCHES
MM
FINISH
SCI-TEC INSTRUMENTS INC.
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This document is not to be disclosed to others, copied or used for production without written permission from SCI-TEC Instruments Inc.
TITLE:
HUMIDITY SENSOR
BOARD SCHEMATIC
SIZE B
SHEET 1 OF 1
DOCUMENT NUMBER BS-E134
REV -
U1 -
R1 -
C3 -
A1 -
LAST USED
NOT USED
COMPUTER GENERATED DRAWING
FILENAME: BS-E134.DWG

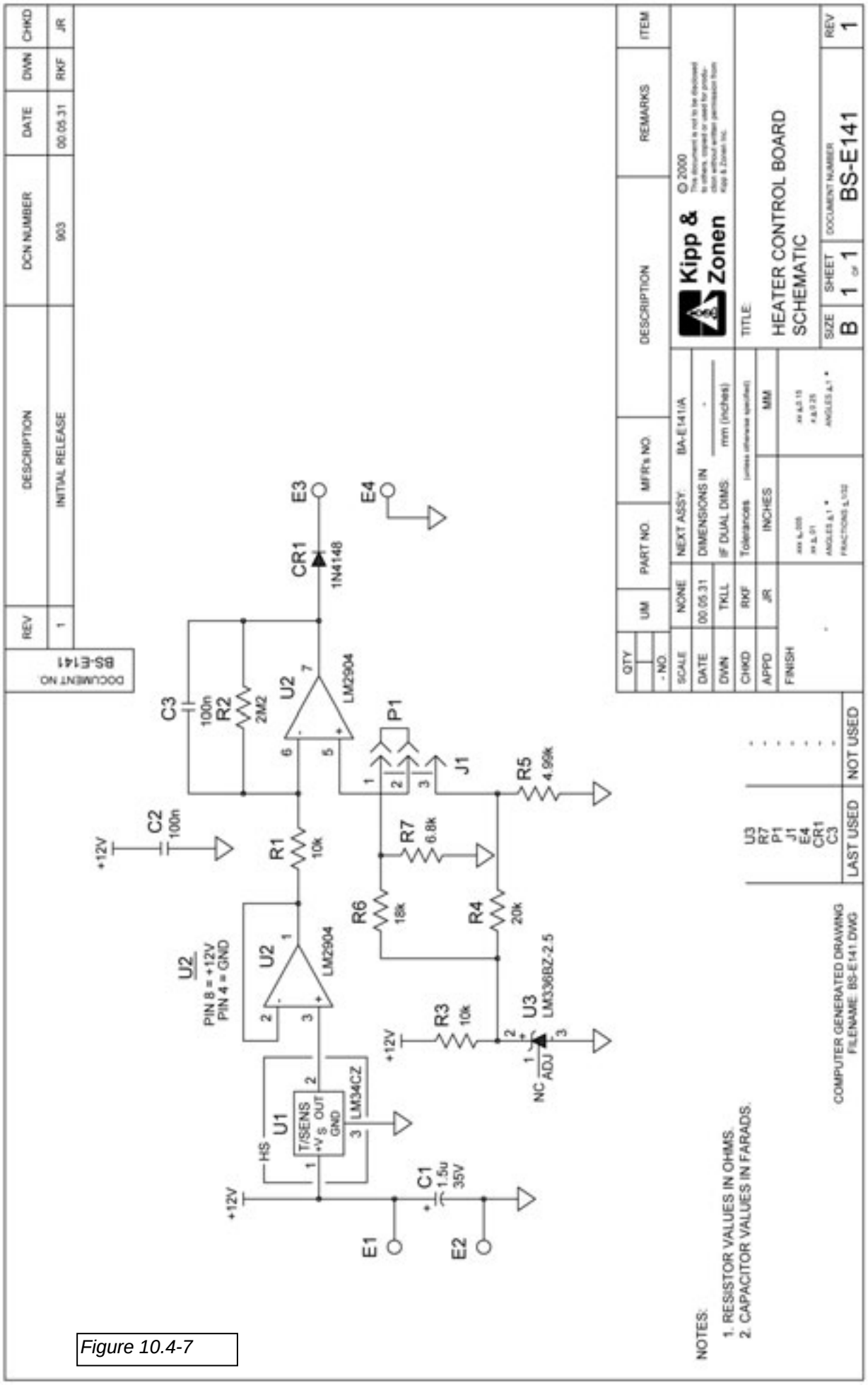

HEATER CONTROL BOARD SCHEMATIC
BS-E141
Kipp & Zonen
BS-E141
DOCUMENT NO.
REV
DESCRIPTION
DCN NUMBER
DATE
DWN
CHKD
INITIAL RELEASE
903
00.05.31
RKF
JR
+12V
C2 100n
R1 10k
C3 100n
R2 2M2
U2 LM2904
P1
J1
R5 4.99k
R7 6.8k
R6 18k
R4 20k
R3 10k
U3 LM336BZ-2.5
CR1 1N4148
E3
E4
E1
E2
C1 1.5u 35V
U1 LM34CZ
T/SENS
+V S
OUT
GND
HS
NC
ADJ
U2
PIN 8 = +12V
PIN 4 = GND
NOTES:
1. RESISTOR VALUES IN OHMS.
2. CAPACITOR VALUES IN FARADS.
COMPUTER GENERATED DRAWING
FILENAME: BS-E141.DWG
LAST USED
NOT USED
U3
R7
P1
J1
E4
CR1
C3
QTY
UM
PART NO.
MFR's NO.
DESCRIPTION
REMARKS
ITEM
SCALE
NONE
NEXT ASSY:
BA-E141/A
DATE
00.05.31
DIMENSIONS IN
mm (inches)
DWN
TKLL
IF DUAL DIMS:
CHKD
RKF
Tolerances
APPD
JR
INCHES
MM
FINISH
SIZE
B
SHEET
1 OF 1
DOCUMENT NUMBER
BS-E141
REV
1
TITLE:
© 2000

Figure 10.4-7

BREWER REFERENCE DOCUMENTATION

Section 10.6 Optics	Figure
10.6.1 Instrument Optics Overall Diagram	10.6-1.1
-Optical Assembly BA-C191/B	10.6-1.2
10.6.2 Foreoptics	
- Assembly BA-F01 /C	10.6-2.1
- Lamp BA-F96	10.6-2.2
- IRIS Actuator BA-F106	10.6-2.3
- Zenith Drive BA-F114	10.6-2.4
10.6.3 Spectrometer	
- Assembly BA-S120	10.6-3.1
- Slitmask Motor Wiring diagram	10.6-3.2
- Spectrometer Assembly Dispersing half BA-S110	10.6-3.3
- Micrometer motor wiring diagram	10.6-3.4
- Spectrometer Assembly Combining half BA-S112	10.6-3.5
- Micrometer motor wiring diagram	10.6-3.6
10.6.4 Photomultiplier	
- Assembly BA-P01	10.6-4.1
- Tube Assembly BA-P02	10.6-4.2
- High Speed Amp Assembly BA-P23	10.6-4.3
- High Speed Amp Board Schematic BS-P23	10.6-4.4

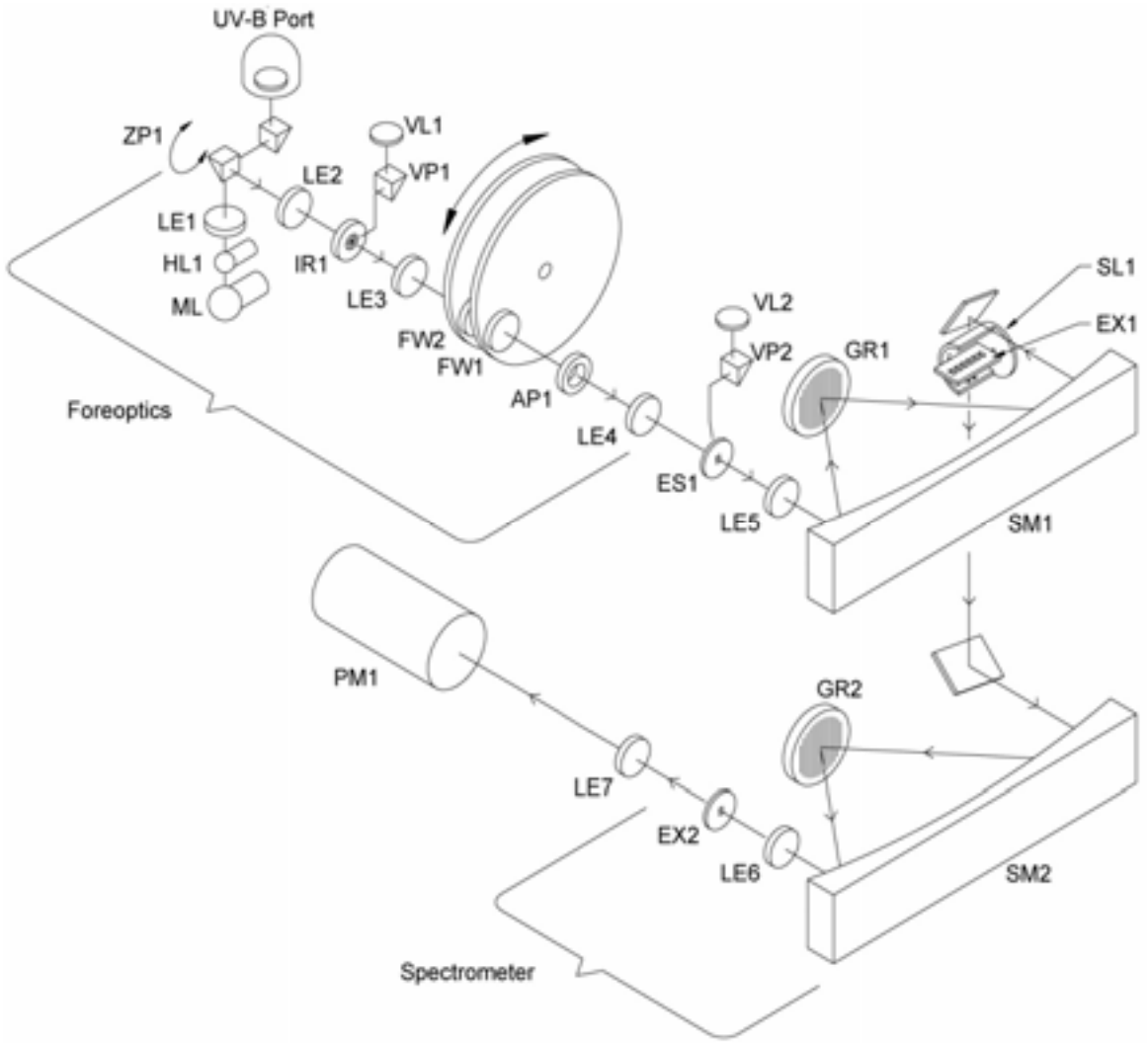


Figure 10.6-1.1

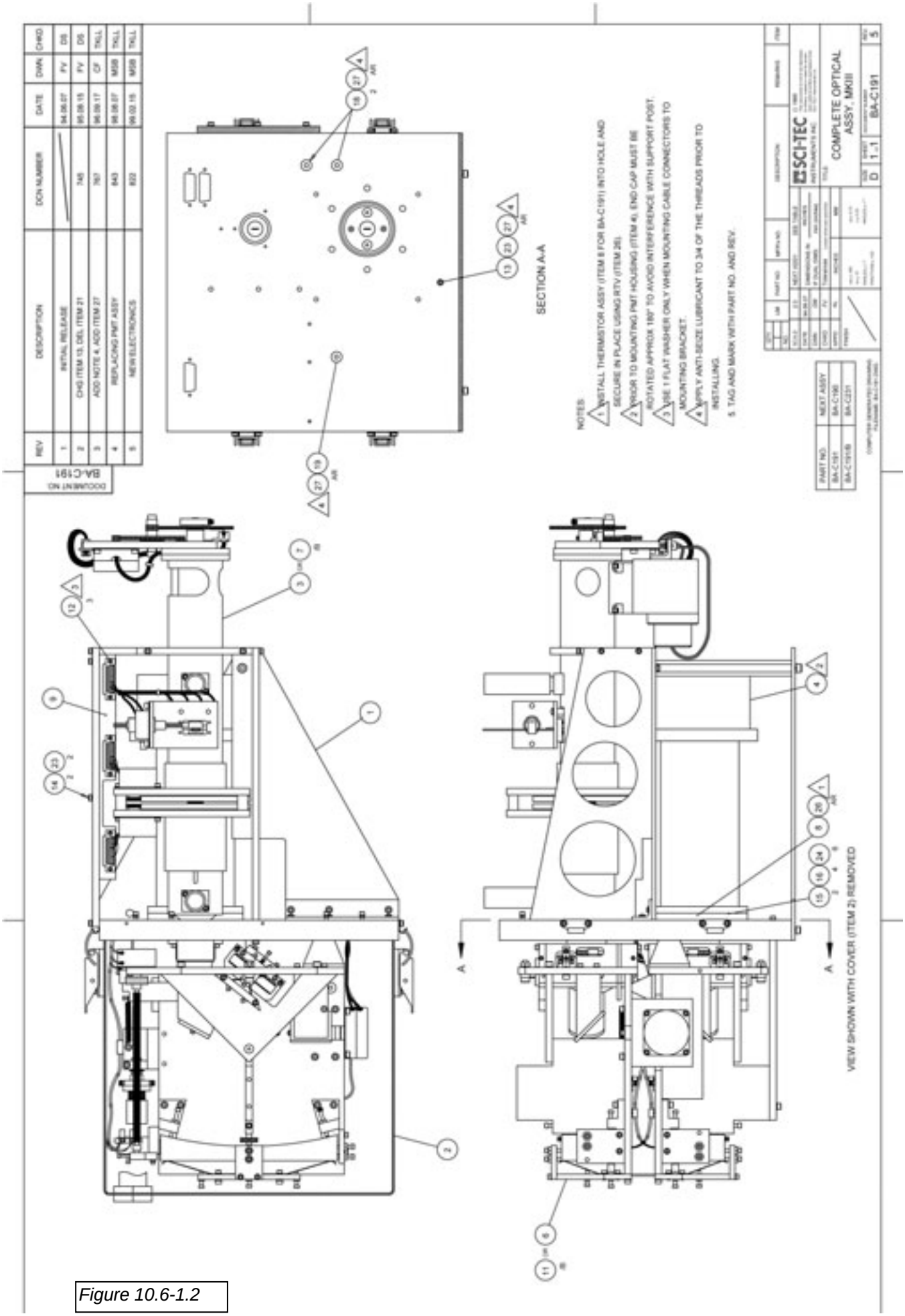


Figure 10.6-1.2

Item No.	BA-C191/B Part No.	BREWER Complete Optical Assy Description	Qty
1	BA-C192	MAIN FRAME ASSY	1.00
2	BA-C196	LIGHT COVER ASSY	1.00
3	BA-F01/B	FORE OPTICS ASSY, MKIV	--
4	BA-P01/B	PHOTOMULTIPLIER HOUSING ASSY	1.00
6	BA-S120	DOUBLE SPECTROMETER ASSY, MKIII	--
7	BA-F01/D	FORE OPTICS ASSY , MKIII, MKIV	1.00
8	BA-W52	THERMISTOR ASSEMBLY	--
9	BM-C70	OPTIONS CONN BRACKET	1.00
11	BA-S120/B	DOUBLE SPECTROMETER ASSY, NEW MKIII	1.00
12	81-90-620	LOCK, CONN SLIDE LOCK POS	3.00
13	83-79-072	SCREW 6-32 X 5/8 HSC SS	1.00
14	83-79-070	SCREW 6-32 X 1/2 HSC SS	2.00
15	83-79-114	SCREW 10-32 X 1/2" LG, SKT HD CAP,SS	2.00
16	83-79-119	SCREW 10-32 X 1" LG, SKT HD CAP,SS	4.00
18	83-87-194	SCRW,8-32X1/2 FL HD HS SS	2.00
19	83-87-211	SCREW,MACH 10-32X5/8 FH H	1.00
23	83-95-749	WASHER #6 SPLIT LOCK SS	3.00
24	83-95-607	WASHER #10, INTERNAL TOOTH LOCK,SS	6.00
26	85-10-150	ADHESIVE, SEALANT RTV	--
27	85-10-905	ANTI-SEIZE LUBRICANT	2.00

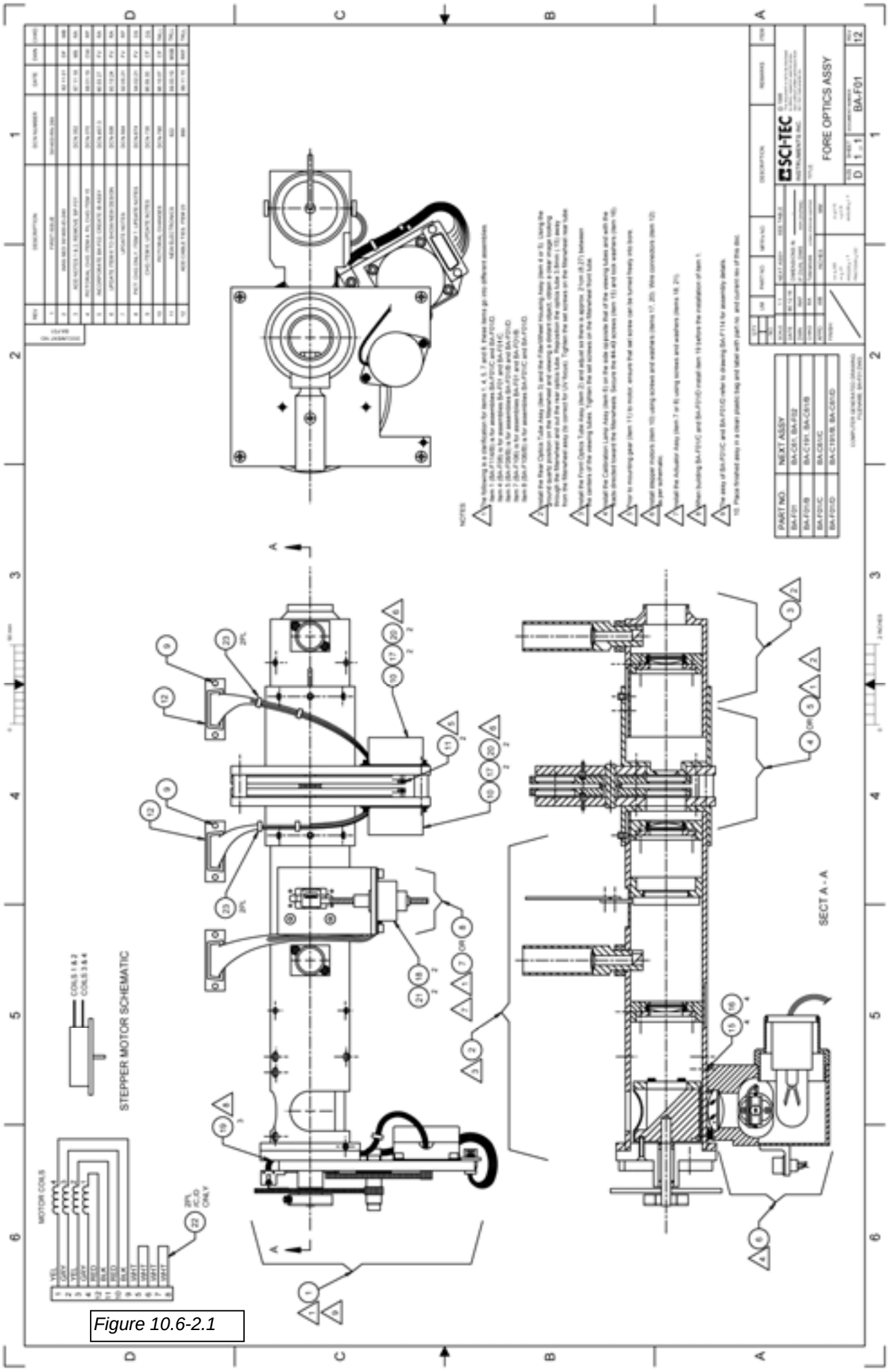


Figure 10.6-2.1

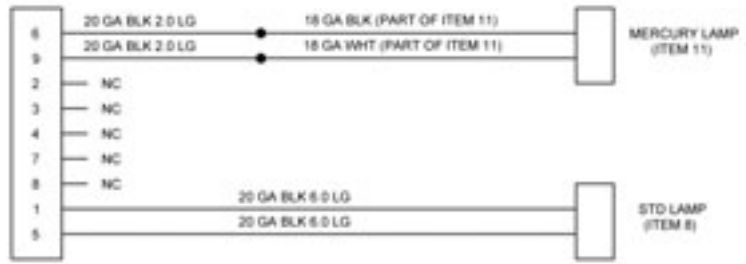
DOCUMENT NO. BA-F01

REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
1	FIRST ISSUE	391400-RN-289			
2	WAS SED 391400-ID-240		82.11.01	DF	WB
3	ADD NOTES 1 & 2, REMOVE 'BP-F01'	DCN-352	87.11.18	MS	RA
4	PICTORIAL CHG. ITEM 4, P/L CHG ITEM 15	DCN-370	88.01.19	CW	RP
5	INCORPORATE BA-F02, CREATE /B ASSY	DCN-457-3	90.03.27	FV	RA
6	UPDATE ITEM 6 TO SHOW NEW DESIGN	DCN-506	90.10.24	FV	RA
7	UPDATE NOTES	DCN-564	92.05.21	FV	RP
8	PICT. CHG ONLY, ITEM 7, UPDATE NOTES	DCN-674	94.02.21	FV	DS
9	CHG ITEM 6, UPDATE NOTES	DCN-735	96.09.30	CF	DS
10	PICTORIAL CHANGES	DCN-785	98.10.07	CF	TKLL
11	NEW ELECTRONICS	822	99.03.19	MSB	TKLL
12	ADD CABLE TIES, ITEM 23	889	99.11.15	RKF	TKLL

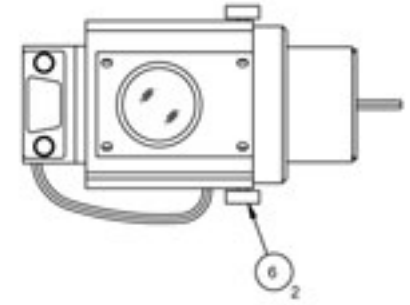
NOTES:

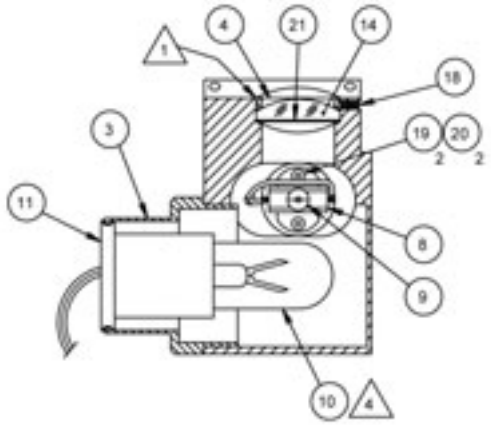
1. The following is a clarification for items 1, 4, 5, 7 and 8, these items go into different assemblies.
   Item 1 (BA-F114/B) is for assemblies BA-F01/C and BA-F01/D.
   Item 4 (BA-F06) is for assemblies BA-F01 and BA-F01/C.
   Item 5 (BA-F06/B) is for assemblies BA-F01/B and BA-F01/D.
   Item 7 (BA-F106) is for assemblies BA-F01 and BA-F01/B.
   Item 8 (BA-F106/B) is for assemblies BA-F01/C and BA-F01/D.
2. Install the Rear Optics Tube Assy (item 3) and the FilterWheel Housing Assy (item 4 or 5). Using the ground quartz position on the filterwheel and viewing a distant object, obtain a clear image looking through the filterwheel and out the rear optics tube. Reposition the optics tube 3.8mm (.15) away from the filterwheel assy (to correct for UV focus). Tighten the set screws on the filterwheel rear tube.
3. Install the Front Optics Tube Assy (item 2) and adjust so there is approx. 21cm (8.27) between the centers of the viewing tubes. Tighten the set screws on the filterwheel front tube.
4. Install the Calibration Lamp Assy (item 6) on the side opposite that of the viewing tubes and with the leads directed toward the filterwheels. Secure the #4-40 screws (item 15) and lock washers (item 16).
5. Prior to mounting gear (item 11) to motor, ensure that set screw can be turned freely into bore.
6. Install stepper motors (item 10) using screws and washers (items 17, 20). Wire connectors (item 12) as per schematic.
7. Install the Actuator Assy (item 7 or 8) using screws and washers (items 18, 21).
8. When building BA-F01/C and BA-F01/D install item 19 before the installation of item 1.
9. The assy of BA-F01/C and BA-F01/D refer to drawing BA-F114 for assembly details.
10. Place finished assy in a clean plastic bag and label with part no. and current rev of this doc.

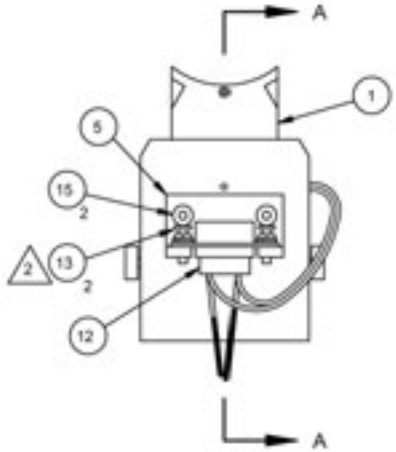
Figure 10.6-2.2



DOCUMENT NO BA-F96	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	1	INITIAL RELEASE		90.11.06	FV	KL
	2	CHG NOTE 2	597	92.06.09	FV	KL
	3	CHG ITEM 10, UPDATE P/L	765	97.03.26	CF	TKLL

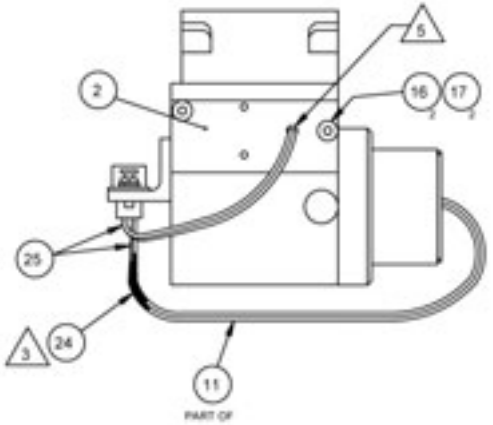






PARTIAL SECTION A-A

SOME HARDWARE NOT
SHOWN FOR CLARITY



NOTES:

1. ENSURE LENS RETAINER (ITEM 4) IS INSTALLED WITH CHAMFERED EDGE TOWARDS LENS AND TOP SIDE FLUSH WITH BOTTOM OF CURVED SURFACE OF ITEM 1. THIS CAN BE ACCOMPLISHED BY USING JIG BA-F81 PA01 BY PLACING THE TUBE ON ON TOP OF THE CURVED SURFACE ON ITEM 1 AND ADJUSTING THE SET SCREW (ITEM 18).
2. INSTALL POSTS (ITEM 13) WITH ONE FLATWASHER AND ONE LOCKWASHER AS SHOWN. DISCARD OTHER HARDWARE.
3. SPLICE 2-2.0 IN. PIECES OF WIRE (ITEM 25) TO ENDS OF WIRES OF LAMP HOLDER (ITEM 11) AND COVER WITH HEATSHRINK (ITEM 24) PRIOR TO INSTALLING IN CONN.
4. ENSURE MERCURY LAMP IS ROTATED SO THAT IT'S FILAMENTS ARE PERPENDICULAR TO THE STANDARD LAMP (ITEM 9).
5. AFTER ASSY, SECURE WIRES IN HOLE USING RTV (ITEM 23). APPLY RTV FROM OUTSIDE OF THE HOUSING.
6. ENSURE LENS AND LAMPS (ITEMS 9,10 AND 21) ARE FREE OF FINGERPRINTS AFTER ASSY. (CLEAN WITH ALCOHOL AND Q-TIP)

COMPUTER GENERATED DRAWING
FILENAME: BA-F96.DWG

QTY - NO.	UM	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM
SCALE	1:1	NEXT ASSY	BA-F01			
DATE	90.10.11	DIMENSIONS IN				
DWN	FV	IF DUAL DIMS	mm (inches)			
CHKD	RA	Tolerances	(unless otherwise specified)			
APPD	KL	INCHES	MM			
FINISH		.xx ± .005 .x ± .01 ANGLES ± 1° FRACTIONS ± 1/32	.x ± 0.13 .x ± 0.25 ANGLES ± 1°			

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TITLE: CALIBRATION LAMP ASSY

SIZE	SHEET	DOCUMENT NUMBER	REV
C	1 of 1	BA-F96	3

Item No.	BA-F01/D Part No.	FORE OPTICS ASSY Description	Qty
1	BA-F114/B	Zenith Drive Assy	1.00
2	BA-F04	Front Optics Tube Assy	1.00
3	BA-F06	Rear Optics Tube Assy	1.00
4	BA-F08	Filterwheel Housing Assy	--
5	BA-F08/B	Filterwheel Housing Assy	1.00
6	BA-F96	Calibration Lamp Assy	1.00
7	BA-F106	Iris Actuator Assy	--
8	BA-F106/B	Iris Actuator Assy	1.00
9	81-90-630	Lock, Conn Sl Ret	2.00
10	50-10-030	Motor Stepper PPS-0-380 1	2.00
11	88-85-653	Gear, 24T, 48P, 1/8F, 1/8B, NY	2.00
12	81-46-124	Conn 'D' 15 Cir M Crimp B	2.00
15	83-79-048	Screw, Mach 4-40 x 5/16 HX	4.00
16	83-95-748	Washer, #4, Split Lock, SS	4.00
17	83-79-047	Screw 4-40 x 1/4 HSC SS	4.00
18	83-51-786	Screw 6-32 x 5/8 Button HD	2.00
19	83-56-143	Screw, Set 6-32 x 1/4 Cup	3.00
20	83-95-604	Washer, #4, Internal Tooth Lock, SS	4.00
21	83-95-605	Washer, #6, Internal Tooth Lock, SS	2.00
22	99-31-441	Wire Hookup, 20AWG IRR PV	0.20

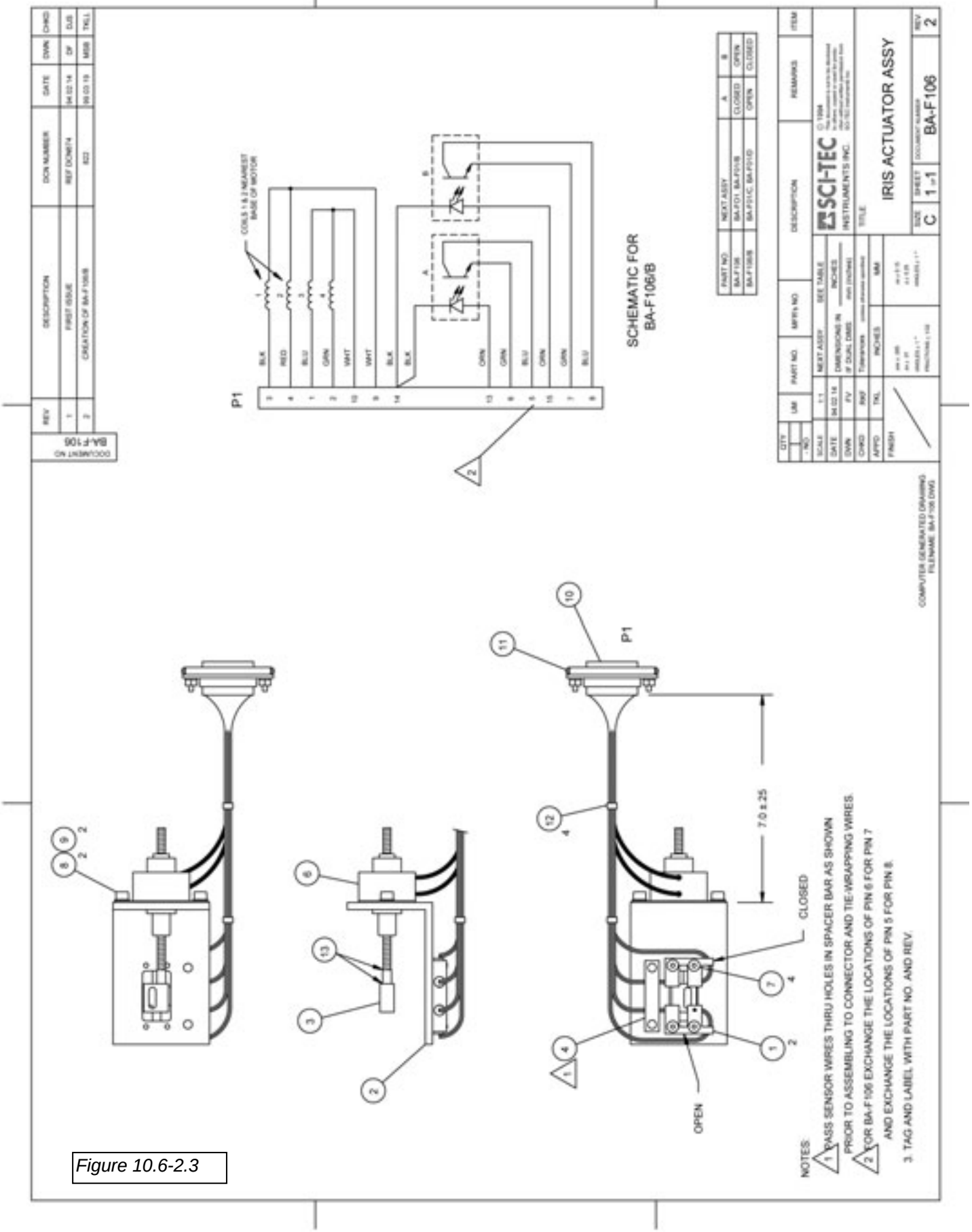
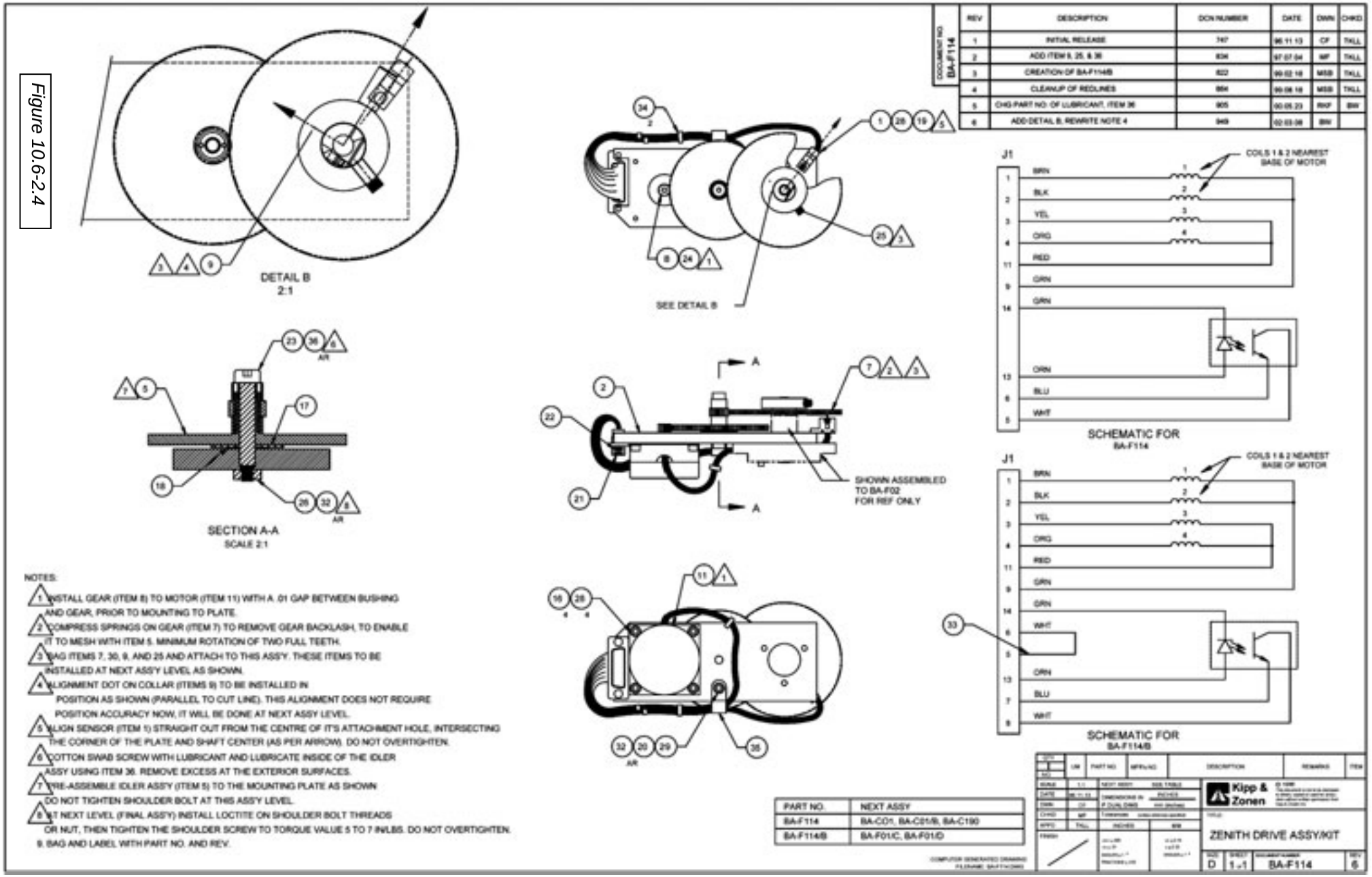


Figure 10.6-2.3

Figure 10.6-2.4



DOCUMENT NO BA-F114	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	1	INITIAL RELEASE	747	96.11.13	CF	TKLL
	2	ADD ITEM 9, 25, & 36	834	97.07.04	MF	TKLL
	3	CREATION OF BA-F114/B	822	99.02.18	MSB	TKLL
	4	CLEANUP OF REDLINES	884	99.08.18	MSB	TKLL
	5	CHG PART NO. OF LUBRICANT, ITEM 36	905	00.05.23	RKF	BW
	6	ADD DETAIL B, REWRITE NOTE 4	949	02.03.08	BW	

NOTES:

1. INSTALL GEAR (ITEM 8) TO MOTOR (ITEM 11) WITH A .01 GAP BETWEEN BUSHING AND GEAR, PRIOR TO MOUNTING TO PLATE.
2. COMPRESS SPRINGS ON GEAR (ITEM 7) TO REMOVE GEAR BACKLASH, TO ENABLE IT TO MESH WITH ITEM 5. MINIMUM ROTATION OF TWO FULL TEETH.
3. BAG ITEMS 7, 30, 9, AND 25 AND ATTACH TO THIS ASSY. THESE ITEMS TO BE INSTALLED AT NEXT ASS'Y LEVEL AS SHOWN.
4. ALIGNMENT DOT ON COLLAR (ITEMS 9) TO BE INSTALLED IN POSITION AS SHOWN (PARALLEL TO CUT LINE). THIS ALIGNMENT DOES NOT REQUIRE POSITION ACCURACY NOW, IT WILL BE DONE AT NEXT ASSY LEVEL.
5. ALIGN SENSOR (ITEM 1) STRAIGHT OUT FROM THE CENTRE OF IT'S ATTACHMENT HOLE, INTERSECTING THE CORNER OF THE PLATE AND SHAFT CENTER (AS PER ARROW). DO NOT OVERTIGHTEN.
6. COTTON SWAB SCREW WITH LUBRICANT AND LUBRICATE INSIDE OF THE IDLER ASSY USING ITEM 36. REMOVE EXCESS AT THE EXTERIOR SURFACES.
7. PRE-ASSEMBLE IDLER ASS'Y (ITEM 5) TO THE MOUNTING PLATE AS SHOWN DO NOT TIGHTEN SHOULDER BOLT AT THIS ASS'Y LEVEL.
8. AT NEXT LEVEL (FINAL ASS'Y) INSTALL LOCTITE ON SHOULDER BOLT THREADS OR NUT, THEN TIGHTEN THE SHOULDER SCREW TO TORQUE VALUE 5 TO 7 INLBS. DO NOT OVERTIGHTEN.
9. BAG AND LABEL WITH PART NO. AND REV.

PART NO.	NEXT ASSY
BA-F114	BA-C01, BA-C01/B, BA-C190
BA-F114/B	BA-F01/C, BA-F01/D

ITEM	QTY	PART NO.	MFR/VND	DESCRIPTION	REMARKS	ITEM

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ZENITH DRIVE ASSY/KIT

SIZE	SHEET	DOCUMENT NUMBER	REV
D	1 of 1	BA-F114	6

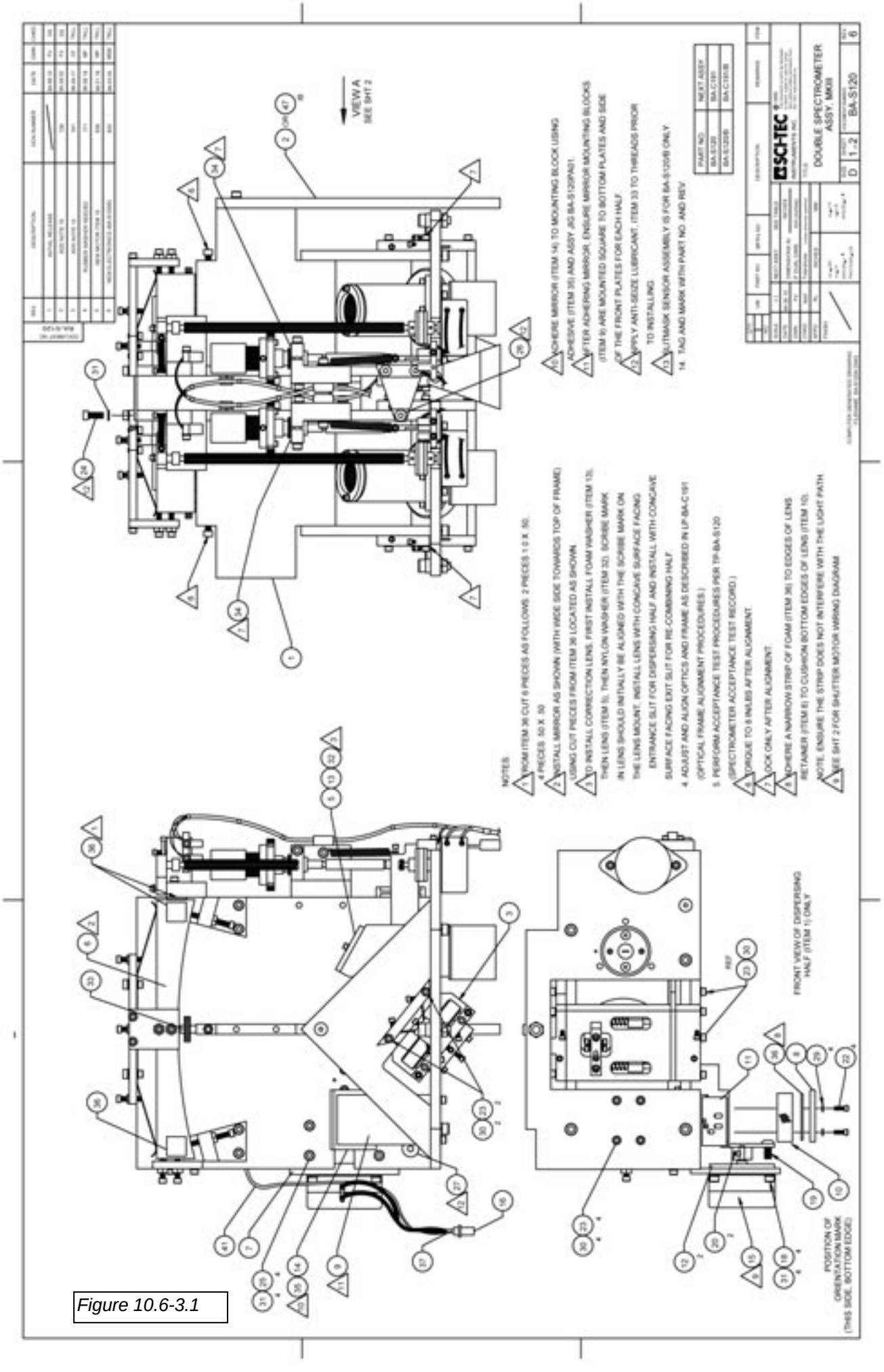

DOUBLE SPECTROMETER ASSY, MX03
BA-S120
SCHTEC
VIEW A SEE SHT 2
NOTES:
FRONT VIEW OF DISPERSING HALF (ITEM 1) ONLY
POSITION OF ORIENTATION MARK (THIS SIDE, BOTTOM EDGE)

Figure 10.6-3.1

DOCUMENT NO BA-S120

REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
1	INITIAL RELEASE		94.06.10	FV	DS
2	ADD NOTE 10	728	95.08.02	FV	DS
3	ADD NOTE 12	767	96.09.17	CF	TKLL
4	RUBBER WASHER NEEDED	771	96.09.18	MF	TKLL
5	NEW MOTOR ITEM 15	836	98.01.18	MF	TKLL
6	NEW ELECTRONICS (BA-S120/B)	822	99.03.05	MSB	TKLL

NOTES:

1. FROM ITEM 36 CUT 6 PIECES AS FOLLOWS: 2 PIECES 1.0 X .50, 4 PIECES .50 X .50
2. INSTALL MIRROR AS SHOWN (WITH WIDE SIDE TOWARDS TOP OF FRAME) USING CUT PIECES FROM ITEM 36 LOCATED AS SHOWN.
3. TO INSTALL CORRECTION LENS, FIRST INSTALL FOAM WASHER (ITEM 13), THEN LENS (ITEM 5), THEN NYLON WASHER (ITEM 32). SCRIBE MARK IN LENS SHOULD INITIALLY BE ALIGNED WITH THE SCRIBE MARK ON THE LENS MOUNT, INSTALL LENS WITH CONCAVE SURFACE FACING ENTRANCE SLIT FOR DISPERSING HALF AND INSTALL WITH CONCAVE SURFACE FACING EXIT SLIT FOR RE-COMBINING HALF.
4. ADJUST AND ALIGN OPTICS AND FRAME AS DESCRIBED IN LP-BA-C191 (OPTICAL FRAME ALIGNMENT PROCEDURES.)
5. PERFORM ACCEPTANCE TEST PROCEDURES PER TP-BA-S12((SPECTROMETER ACCEPTANCE TEST RECORD.)
6. TORQUE TO 8 IN/LBS AFTER ALIGNMENT.
7. LOCK ONLY AFTER ALIGNMENT.
8. ADHERE A NARROW STRIP OF FOAM (ITEM 36) TO EDGES OF LENS RETAINER (ITEM 8) TO CUSHION BOTTOM EDGES OF LENS (ITEM 10). NOTE, ENSURE THE STRIP DOES NOT INTERFERE WITH THE LIGHT PATH.
9. SEE SHT 2 FOR SHUTTER MOTOR WIRING DIAGRAM.
10. ADHERE MIRROR (ITEM 14) TO MOUNTING BLOCK USING ADHESIVE (ITEM 35) AND ASSY JIG BA-S120PA01.
11. AFTER ADHERING MIRROR, ENSURE MIRROR MOUNTING BLOCKS (ITEM 9) ARE MOUNTED SQUARE TO BOTTOM PLATES AND SIDE OF THE FRONT PLATES FOR EACH HALF.
12. APPLY ANTI-SEIZE LUBRICANT, ITEM 33 TO THREADS PRIOR TO INSTALLING
13. SLITMASK SENSOR ASSEMBLY IS FOR BA-S120/B ONLY.
14. TAG AND MARK WITH PART NO. AND REV.

PART NO.	NEXT ASSY
BA-S120	BA-C191
BA-S120/B	BA-C191/B

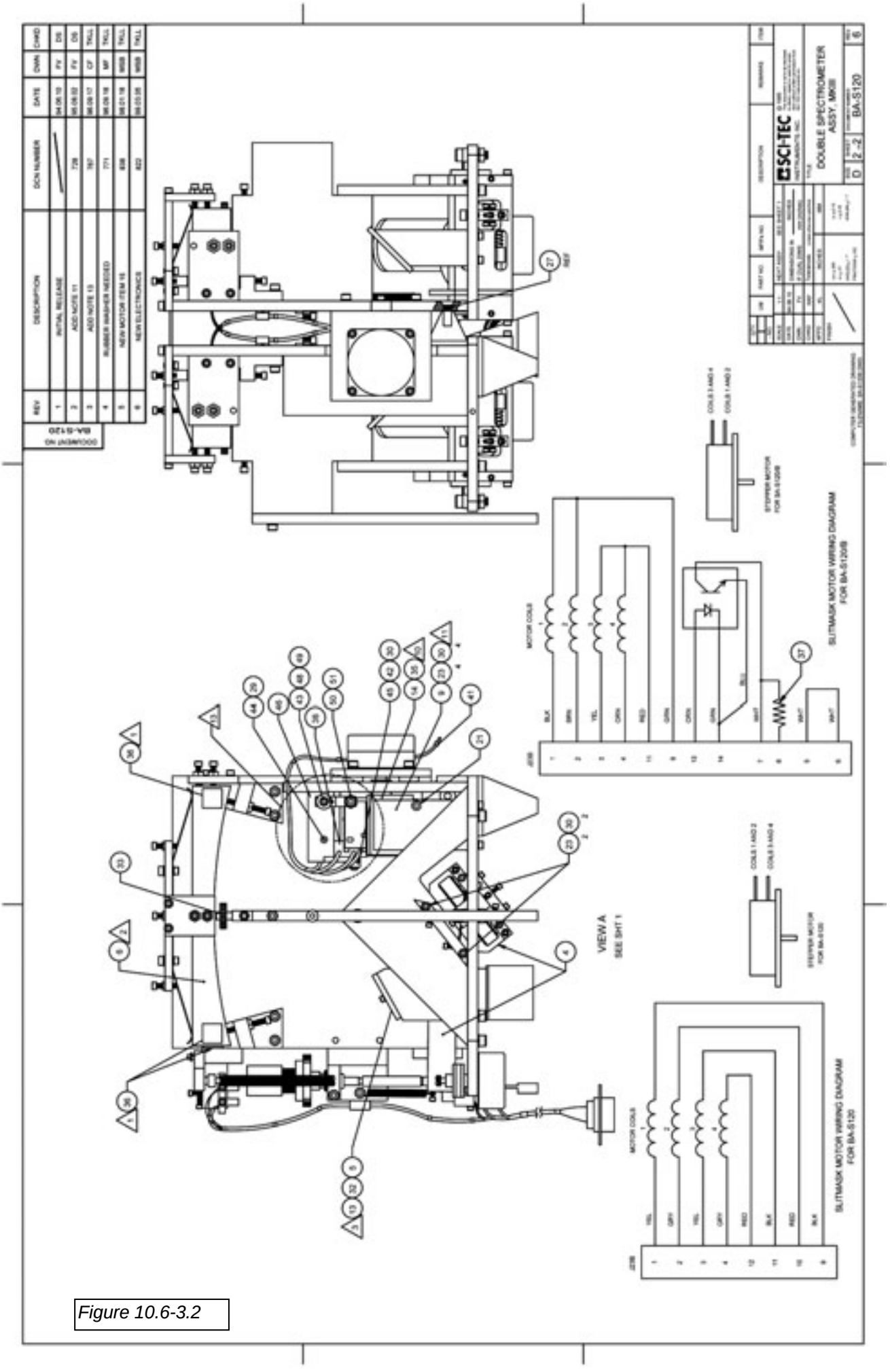


Figure 10.6-3.2

	BA-S120/B	DOUBLE SPECTROMETER ASSEMBLY	
Item No.	Part No.	Description	Qty
1	BA-S110	SPECTR MECH ASSY,DISPERSG	1.00
2	BA-S112	SPECTR MECH ASSY,RE-COMBINING	--
3	BA-S115/A	GRATING SUPPT ASSY, DISPERSING	1.00
4	BA-S115/B	GRATING SUPPT ASSY, RE-COMBINING	1.00
5	BM-S42	CORRECTION LENS	2.00
6	BM-S47	SPHERICAL MIRROR	2.00
7	BM-S130	SHUTTER MOTOR MOUNT , MKIII	1.00
8	BM-S88	LENS RETAINER	1.00
9	BM-S92	MIRROR MOUNT	2.00
10	BM-S94	PLANO-CONCAVE QUARTZ LENS	1.00
11	BM-S129	EXIT SLITMASK, MKIII	1.00
12	BM-S127	SLITMASK MOTOR MOUNTING BLOCK	2.00
13	BM-S121	WASHER, CORRECTION LENS	2.00
14	10-14-010	FLAT MIRROR, 1.5" x 1.5" x 3mm	2.00
15	50-10-033	MOTOR, STEPPER, 12V,48 STEP	1.00
16	81-46-124	CONN "D" 15 CIR M CRIMP B	1.00
17	LP-BA-S120	OPTICAL FRAME ALIGNMENT PROC	--
18	83-79-067	SCREW 6-32 X 5/16 HX	4.00
19	83-51-802	SCREW,8-32 X 3/8 BUTTON H	1.00
20	83-79-047	SCREW 4-40 X 1/4 HSC SS	2.00
21	83-78-046	SCREW, MACH, 6-32x3/4 HX	1.00
22	83-79-027	SCREW, 2-56 X 1/4 HSC SS	4.00
23	83-79-051	SCREW 4-40 X 1/2 HSC SS	17.00
24	83-79-068	SCREW 6-32 X 3/8 HSC SS	1.00
25	83-79-070	SCREW 6-32 X 1/2 HSC SS	4.00
26	83-87-179	SCREW,6-32X1/2 FL HD HS SS	1.00
27	83-87-211	SCREW,MACH 10-32X5/8 FH H	1.00
28	TP-BA-S120	ACCEPTANCE TEST RECORD	--
29	83-95-747	WASHER #2 SPLIT LOCK SS	5.00
30	83-95-748	WASHER #4 SPLIT LOCK SS	18.00
31	83-95-749	WASHER #6 SPLIT LOCK SS	9.00
32	83-95-830	WASHER, SPECIAL 7/8 ID X1	2.00
33	85-10-905	ANTI-SEIZE LUBRICANT	2.00
34	85-10-145	ADHESIVE SEALANT (LOCTITE 242)	0.10
35	85-10-150	ADHESIVE SEALANT (RTV 3145)	2.00
36	98-10-010	SHEET, CLOSED CELL NEOPRENE, 1/16"	4.00
37	88-09-122	RES, 100 K, 1/4 W, 5%, CARBON	1.00
38	89-70-030	SENSOR, OP SW, SLOT 0.003" APR	1.00
39	99-20-035	SLEEVING HEAT SHRNK 0.063	0.40
40	99-20-027	SLEEVING HEAT SHRNK 0.125	0.33
41	85-80-450	TIE-CABLE 4-1/8X0.1 NYL 18	4.00
42	83-51-763	SCREW, 4-40 X 3/8 BUTTON H	1.00
43	83-51-765	SCRW 4-40 X 1/2 BUTTON HD	1.00
44	83-51-754	SCRW 2-56 X 3/8 BUTTON HD	1.00
45	BM-S132	SLITMASK SENSOR MTG NUT MKIII	1.00
46	BM-S131	SLITMASK SENSOR MTG BLK MKIII	1.00
47	BA-S112/B	SPECTR MECH ASSY,RE-COMBINING	1.00
48	BM-S93	SHUTTER STOP	1.00
49	83-95-011	WASHER #4 FLAT SS	1.00
50	83-79-044	SCREW, MACH 6-32 X 1/2 HX	1.00
51	83-40-257	NUT 6-32 HX HYLON	1.00
52	99-31-441	WIRE HOOKUP 20 AWG IRR PV	0.20

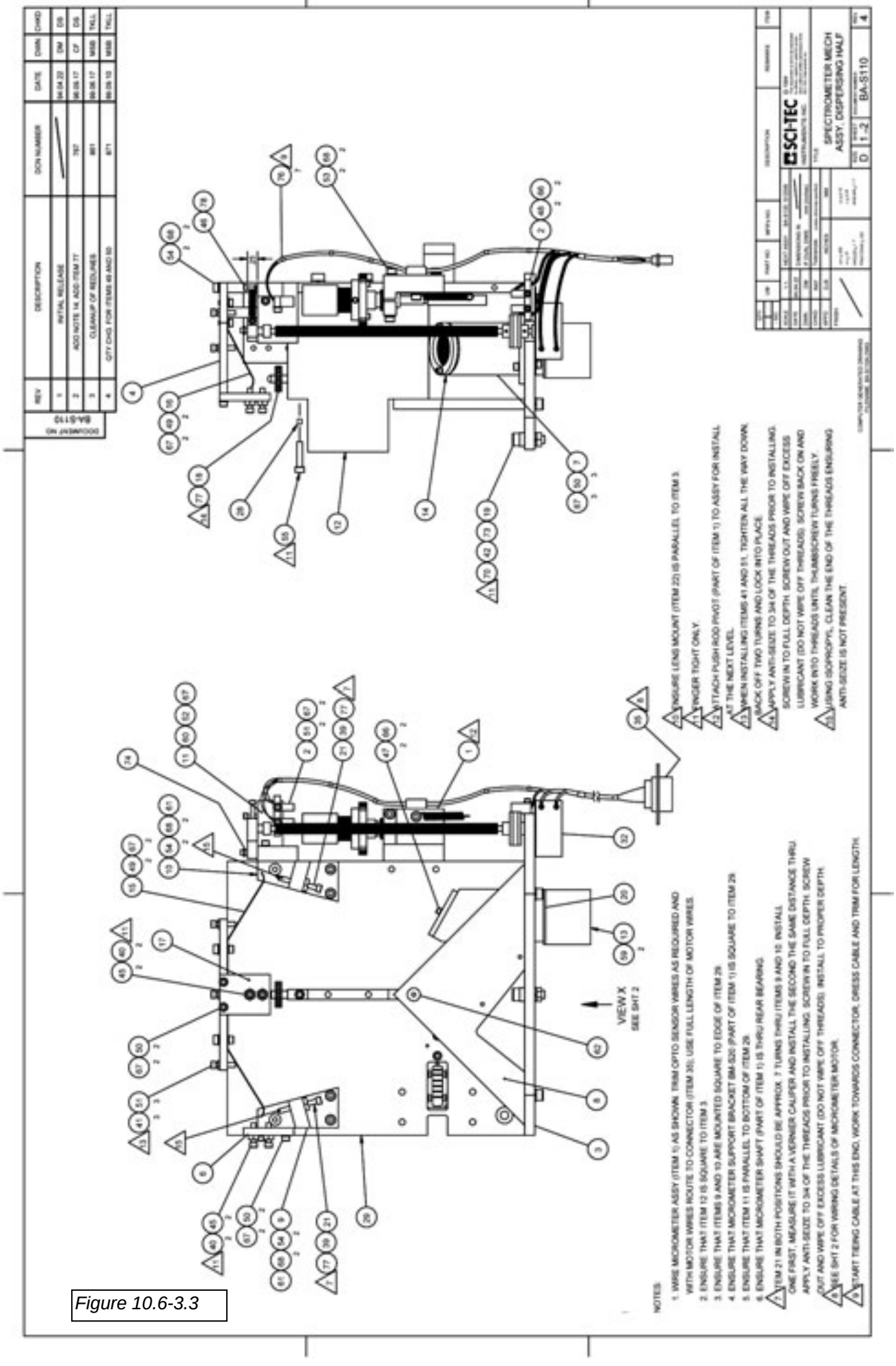
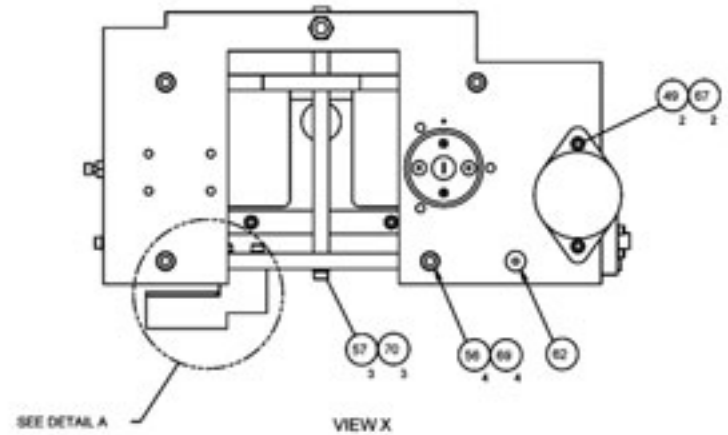
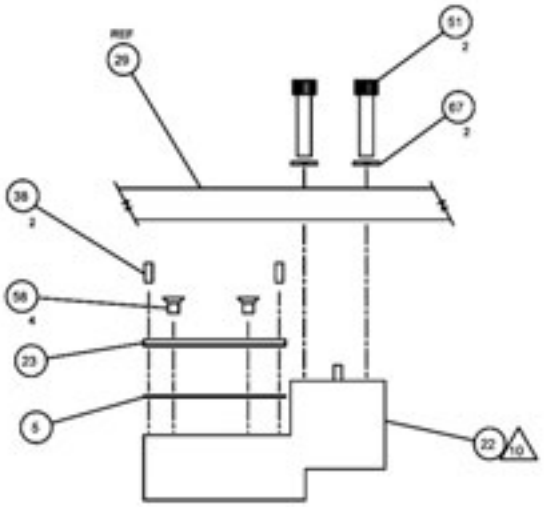


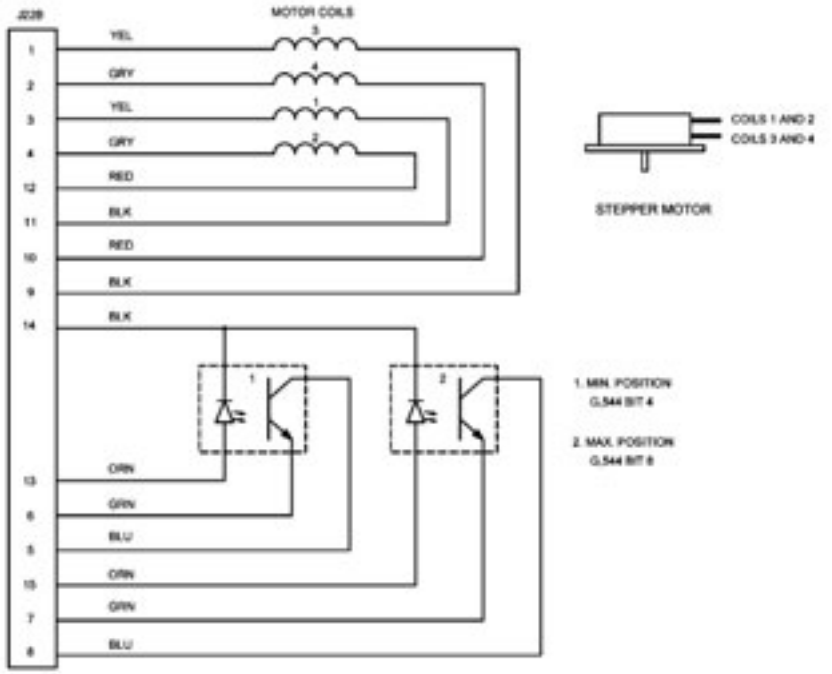
Figure 10.6-3.3

Figure 10.6-3.4





DOCUMENT NO. BA-S110	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	1	INITIAL RELEASE		94.04.22	DM	DS
	2	ADD NOTE 14, ADD ITEM 77	767	96.09.17	CF	TKLL
	3	CLEANUP OF REDLINES	861	99.06.17	MSB	TKLL
	4	QTY CHG FOR ITEMS 49 AND 50	871	99.09.10	MSB	TKLL



MICROMETER MOTOR SCHEMATIC

QTY PER ASSY	U/M	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM

SCI-TEC INSTRUMENTS INC.

SPECTROMETER MECH ASSY, DISPERSING HALF

SIZE	SHEET	DOCUMENT NUMBER	REV
D	2 -2	BA-S110	4

COMPUTER GENERATED DRAWING

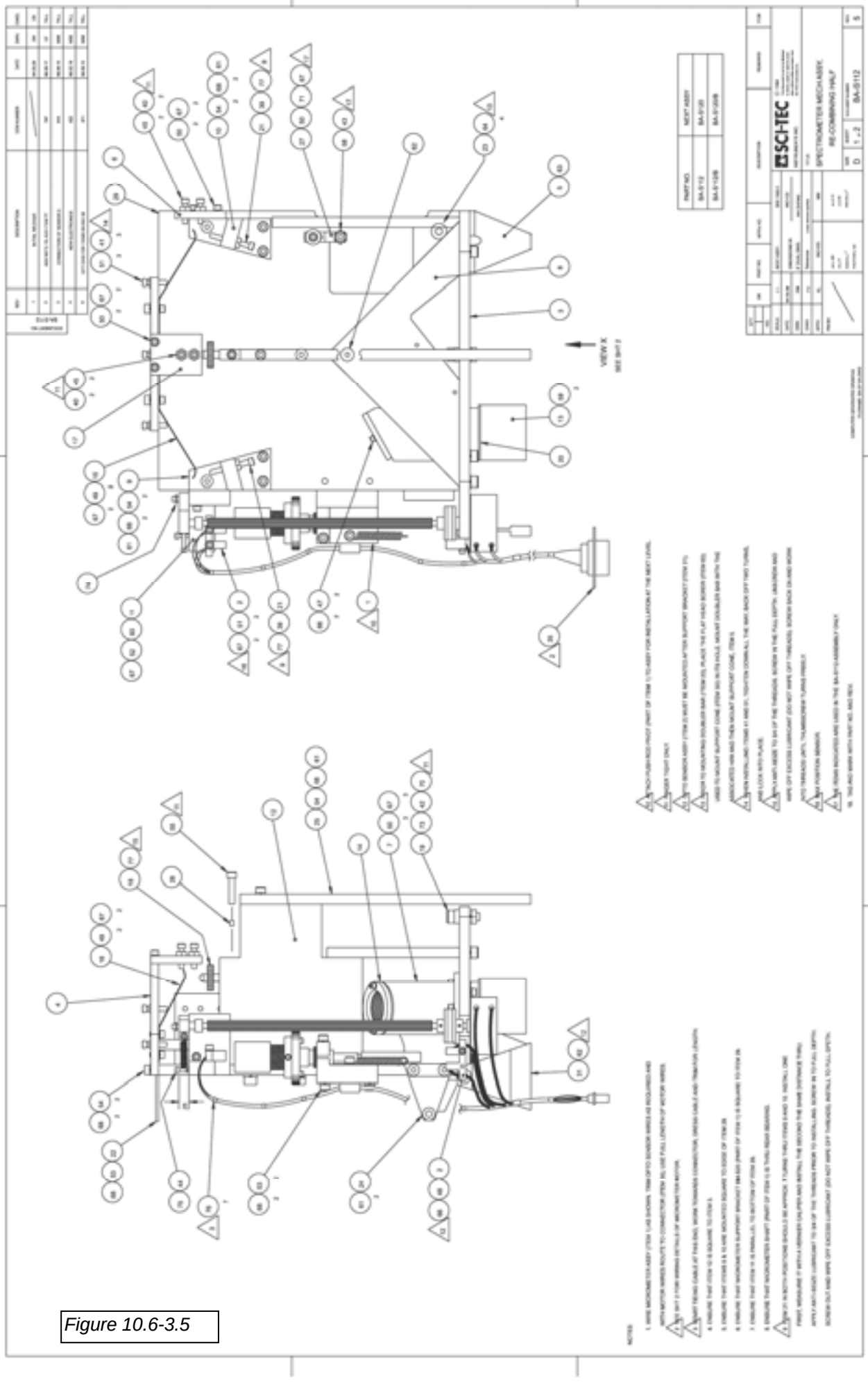


Figure 10.6-3.5

DOCUMENT NO. BA-S112	REV	DESCRIPTION	DCN NUMBER	DATE	DWN.	CHKD.
	1	INITIAL RELEASE		94.05.09	DM	DS
	2	ADD NOTE 18, ADD ITEM 77	797	96.06.17	CF	TKLL
	3	CONNECTION OF SENSOR 2	844	96.06.10	MSB	TKLL
	4	NEW ELECTRONICS	822	96.02.19	MSB	TKLL
	5	QTY CHG FOR ITEMS 48 AND 50	871	96.06.10	MSB	TKLL

NOTES:

1. WIRE MICROMETER ASSY (ITEM 1) AS SHOWN. TRIM OPTO SENSOR WIRES AS REQUIRED AND WITH MOTOR WIRES ROUTE TO CONNECTOR (ITEM 35). USE FULL LENGTH OF MOTOR WIRES.
2. SEE SHT 2 FOR WIRING DETAILS OF MICROMETER MOTOR.
3. START TIEING CABLE AT THIS END, WORK TOWARDS CONNECTOR, DRESS CABLE AND TRIM FOR LENGTH.
4. ENSURE THAT ITEM 12 IS SQUARE TO ITEM 3.
5. ENSURE THAT ITEMS 9 & 10 ARE MOUNTED SQUARE TO EDGE OF ITEM 29.
6. ENSURE THAT MICROMETER SUPPORT BRACKET BM-S20 (PART OF ITEM 1) IS SQUARE TO ITEM 29.
7. ENSURE THAT ITEM 11 IS PARALLEL TO BOTTOM OF ITEM 29.
8. ENSURE THAT MICROMETER SHAFT (PART OF ITEM 1) IS THRU REAR BEARING.
9. ITEM 21 IN BOTH POSITIONS SHOULD BE APPROX. 7 TURNS THRU ITEMS 9 AND 10. INSTALL ONE FIRST, MEASURE IT WITH A VERNIER CALIPER AND INSTALL THE SECOND THE SAME DISTANCE THRU. APPLY ANTI-SEIZE LUBRICANT TO 3/4 OF THE THREADS PRIOR TO INSTALLING. SCREW IN TO FULL DEPTH. SCREW OUT AND WIPE OFF EXCESS LUBRICANT (DO NOT WIPE OFF THREADS). INSTALL TO FULL DPETH.
10. ATTACH PUSH ROD PIVOT (PART OF ITEM 1) TO ASSY FOR INSTALLATION AT THE NEXT LEVEL.
11. FINGER TIGHT ONLY.
12. OPTO SENSOR ASSY (ITEM 2) MUST BE MOUNTED AFTER SUPPORT BRACKET (ITEM 31).
13. PRIOR TO MOUNTING DOUBLER BAR (ITEM 23), PLACE THE FLAT HEAD SCREW (ITEM 63) USED TO MOUNT SUPPORT CONE (ITEM 30) IN ITS HOLE. MOUNT DOUBLER BAR WITH THE ASSOCIATED H/W AND THEN MOUNT SUPPORT CONE, ITEM 5.
14. WHEN INSTALLING ITEMS 41 AND 51, TIGHTEN DOWN ALL THE WAY, BACK OFF TWO TURNS, AND LOCK INTO PLACE.
15. APPLY ANTI-SEIZE TO 3/4 OF THE THREADS. SCREW IN THE FULL DEPTH. UNSCREW AND WIPE OFF EXCESS LUBRICANT (DO NOT WIPE OFF THREADS). SCREW BACK ON AND WORK INTO THREADS UNTIL THUMBSCREW TURNS FREELY.
16. MAX POSITION SENSOR.
17. THE ITEMS INDICATED ARE USED IN THE BA-S112 ASSEMBLY ONLY.
18. TAG AND MARK WITH PART NO. AND REV.

PART NO.	NEXT ASSY
BA-S112	BA-S120
BA-S112/B	BA-S120/B

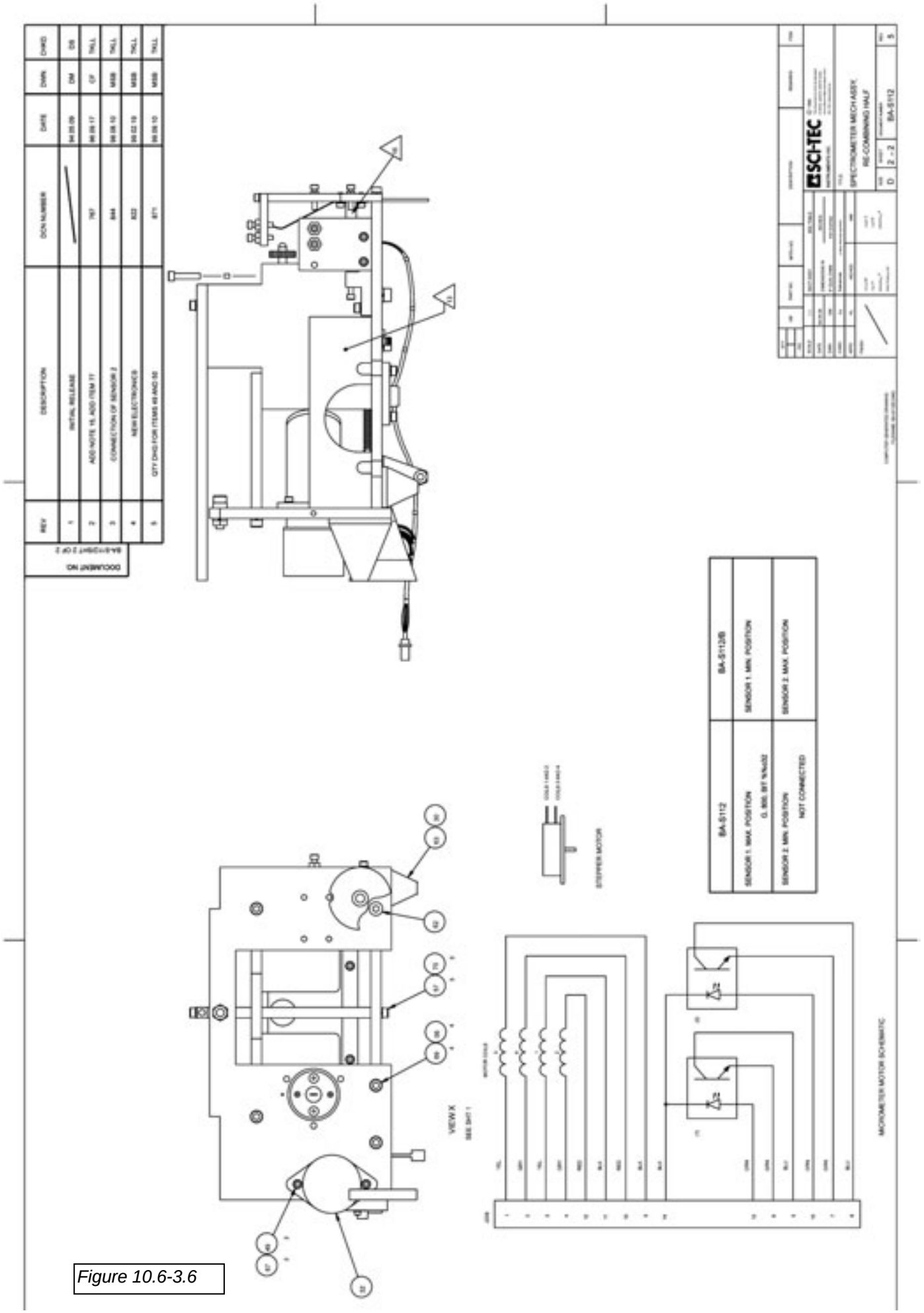


Figure 10.6-3.6

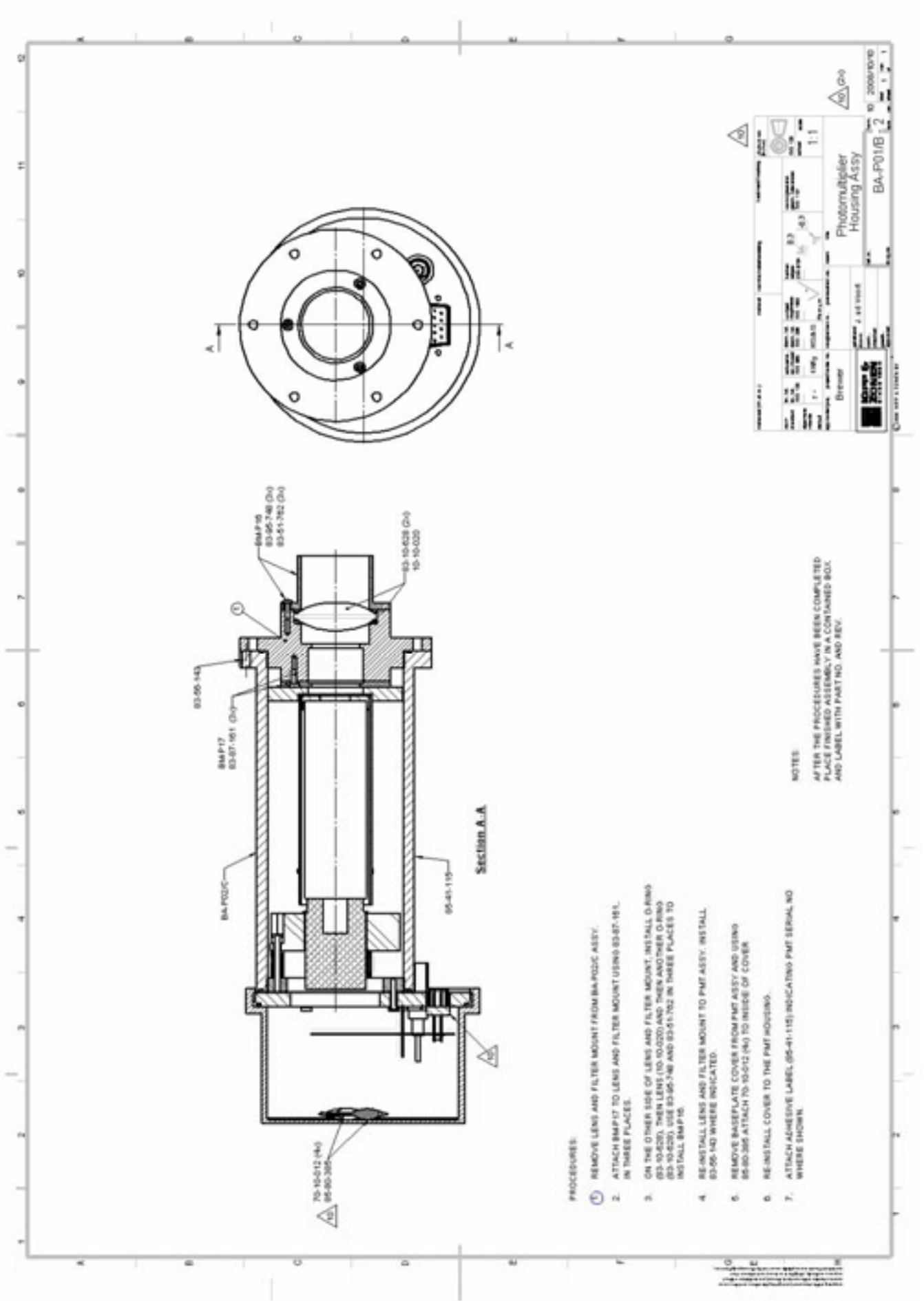

Photomultiplier Housing Assy
BA-P01/B
Section A-A
PROCEDURES:
1. REMOVE LENS AND FILTER MOUNT FROM BA-P02/C ASSY.
2. ATTACH BMP17 TO LENS AND FILTER MOUNT USING 03-87-161 IN THREE PLACES.
3. ON THE OTHER SIDE OF LENS AND FILTER MOUNT, INSTALL O-RING (03-10-020), THEN LENS (10-10-020) AND THEN ANOTHER O-RING (03-10-020). USE 03-95-748 AND 03-51-762 IN THREE PLACES TO INSTALL BMP16.
4. RE-INSTALL LENS AND FILTER MOUNT TO PMT ASSY. INSTALL 03-55-143 WHERE INDICATED.
5. REMOVE BASEPLATE COVER FROM PMT ASSY AND USING 85-80-365 ATTACH 70-10-012 (4x) TO INSIDE OF COVER
6. RE-INSTALL COVER TO THE PMT HOUSING.
7. ATTACH ADHESIVE LABEL (95-41-115) INDICATING PMT SERIAL NO WHERE SHOWN.
NOTES:
AFTER THE PROCEDURES HAVE BEEN COMPLETED PLACE FINISHED ASSEMBLY IN A CONTAINED BOX AND LABEL WITH PART NO. AND REV.

Figure 10.6-4.1

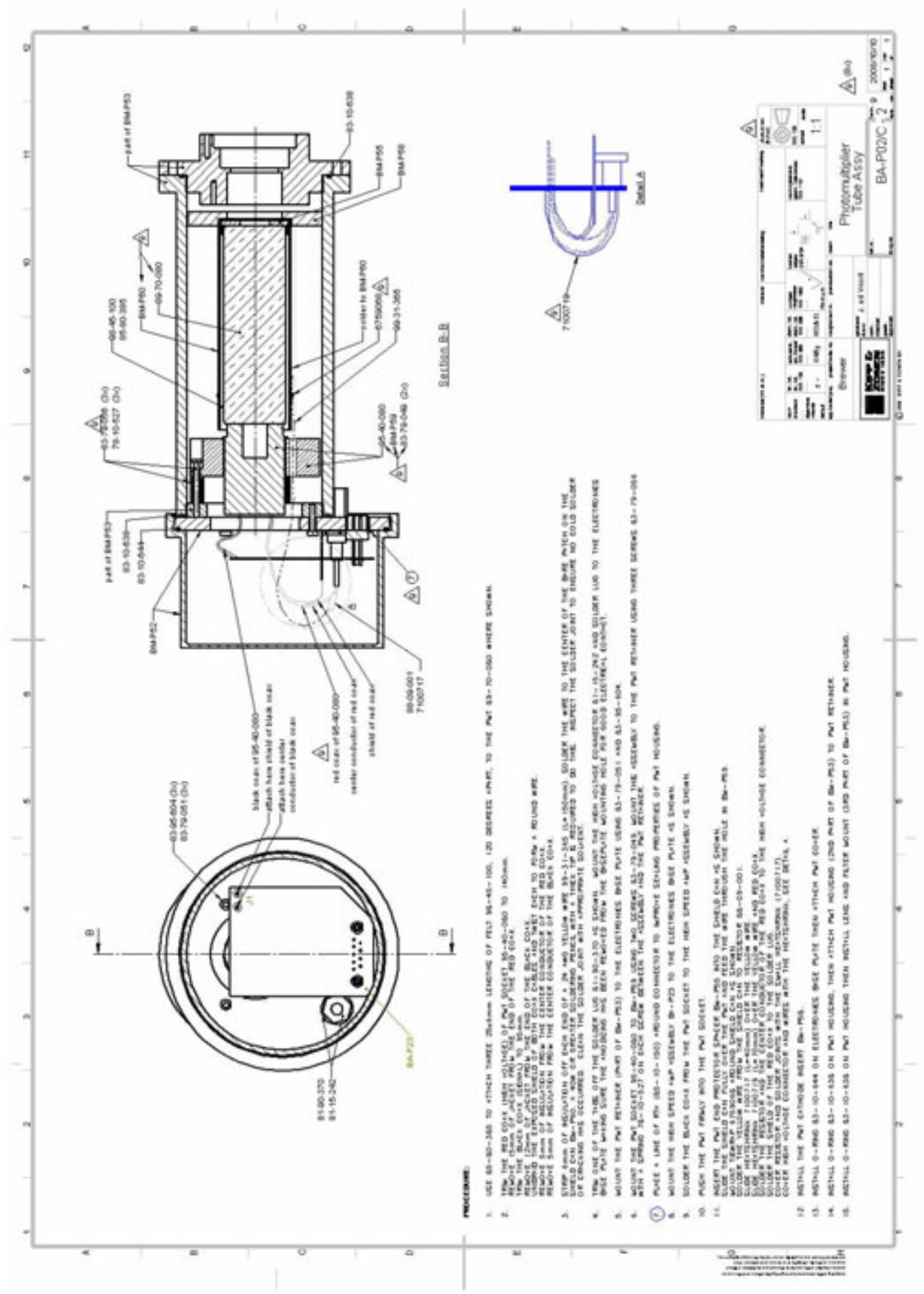


Figure 10.6-4.2

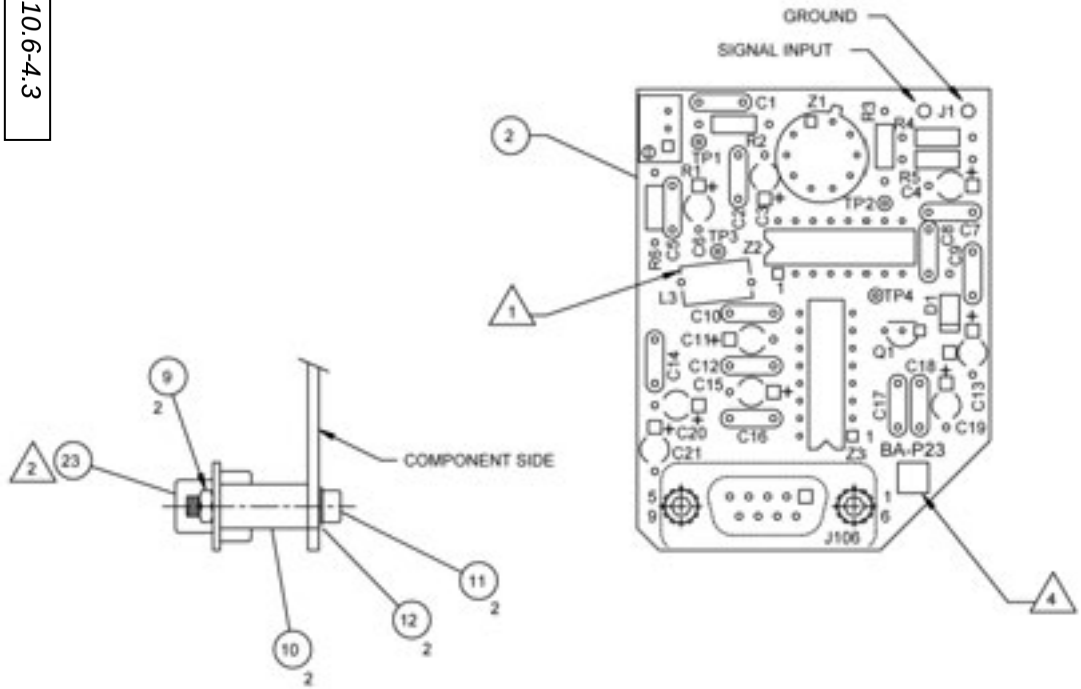
Part List

Part No.	Description	Qty BA-P01/B
BA-P02/C-F	Photomultiplier Tube Assy	1
BM-P16	Lens Retainer and Light Trap	1
BM-P17	Filter Retainer	1
83-10-628	O-ring, #028, 1 3/8x1 1/2x1/16 N.B.R.	2
85-41-115	Label, Adhesive, 3/8"x1 1/4"	1
70-10-012	Pillow Pak 2g silicagel	4
83-95-748	Washer, #4 Split Lock, SS, Med Pat. 316	3
83-87-161	Screw, 4-40x1/4, Flt Hd, Hex Skt, SS	3
83-51-762	Screw, 4-40x5/16, Btn Hd, Hex Skt Cap, SS	3
83-56-143	Screw,Set, 6-32x1/4, Cup Pt, Hex Skt,SS	1
10-10-020	Lens,BI/CX G1 FSD QTZ,38.1 mm D,38.1 mm FL.	1
85-80-385	Adhesive Transfer Tape 0.75"	75mm

Part List

Part No.	Description	Qty BA-P02/C
BA-P23/O	High Speed Amp Board Assy	1
BM-P52	Baseplate Cover Assy, PMT	1
BM-P53	Housing Cap Assy, PMT	1
BM-P60	Magnetic Shield, Can	1
BM-P55	Spacer, PMT End Protector	1
BM-P58	Insert, PMT Cathode	1
BM-P59	Spacer PMT	1
99-31-365	Wire Sfrd IRR PVC 24Ga Yellow	150mm
98-45-100	Felt, Any Colour, Approx .05" Thk	0.01
95-40-080	PMT socket	1
89-70-080	Photo Multiplier Tube	1
85-80-385	Tape, Adhesive, Transfer, 3/4" Wide	25mm
83-95-604	Washer, #4, Internal Tooth Lock, SS	3
83-79-049	Screw, 4-40 x 3/8”, Skt Hd, SS	2
83-79-051	Screw, 4-40 x 1/2" Skt Hd, SS	3
83-79-056	Screw, 4-40 x 1”, Skt Hd, SS	3
83-10-644	O-Ring #044 - 3 3/4 x 3 7	1
83-10-638	O-Ring #038 - 2 5/8 x 2 3	2
81-90-370	Lug Connector, BNC	1
81-15-242	Bulkhead Jack, BNC	1
78-10-527	Sprng Comp,.88x.24dx.018w	3
6759068	Tiewrap	1
7100717	Heatshrink 1/8	40mm
7100719	Heatshrink 1/2	70mm
88-09-001	Resistor 10M, MRS25, 1%	1
85-10-150	Adhesive, Sealant	

Figure 10.6-4.3



DOCUMENT NO. BA-P23	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	3			83.02.01	DF	KL
	4		8505-DCN-239	85.05.01	DF	KL
	5	P/L REVISION	331	88.01.06	CW	RA
	6	REDRAWN - CHG Q1 & UPDATE NOTES	760	95.11.22	FV	RA
	7	CHANGE ITEM 10 & 11	786	96.10.09	CF	TKLL
	8	CHANGE TO TEST NOTES	880	99.10.14	RKF	TKLL
	9	NEW BOARD LAYOUT	953	02.03.11	RKF	

NOTES:

1. ENSURE THE TURNS OF L3 DO NOT COME IN CONTACT WITH EACH OTHER OR CONTACT THE PCB.
2. ASSEMBLE CONNECTOR (ITEM 23) AND H/W AS SHOWN. TRIM PINS TO PROTRUDE .090 ON COMPONENT SIDE OF BOARD AND SOLDER IN PLACE. THE NUTS (ITEM 9) ARE TEMPORARY ONLY AND WILL BE REMOVED WHEN INSTALLED AT THE NEXT ASSEMBLY LEVEL.
3. TEST FINISHED ASSY ACCORDING TO PROCEDURE TP-BA-P23 (ITEM 1).
4. MARK CURRENT REV OF THIS DWG IN BOX PROVIDED.
5. PLACE TESTED ASSY IN ANTISTATIC BAG, ITEM 40, ATTACH LABEL AND IDENTIFY THUS: BA-P23 REV 9.

PART NO.	NEXT ASSY
BA-P23	BA-C122/D, BA-C122/E, BA-C222, BA-P02, BA-P02/B, BA-P02/C

COMPUTER GENERATED DRAWING
FILENAME: BA-P23.DWG

QTY / - NO.	UM	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM

SCALE	2:1	NEXT ASSY	SEE TABLE
DATE	83.02.01	DIMENSIONS IN	INCHES
DWN	DF	IF DUAL DIMS	mm (inches)
CHKD	DBR	Tolerances (unless otherwise specified)	
APPD	KL	INCHES	MM
FINISH			

Kipp & Zonen

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TITLE: HIGH SPEED AMP BOARD ASSY

SIZE	SHEET	DOCUMENT NUMBER	REV
C	1 of 1	BA-P23	9

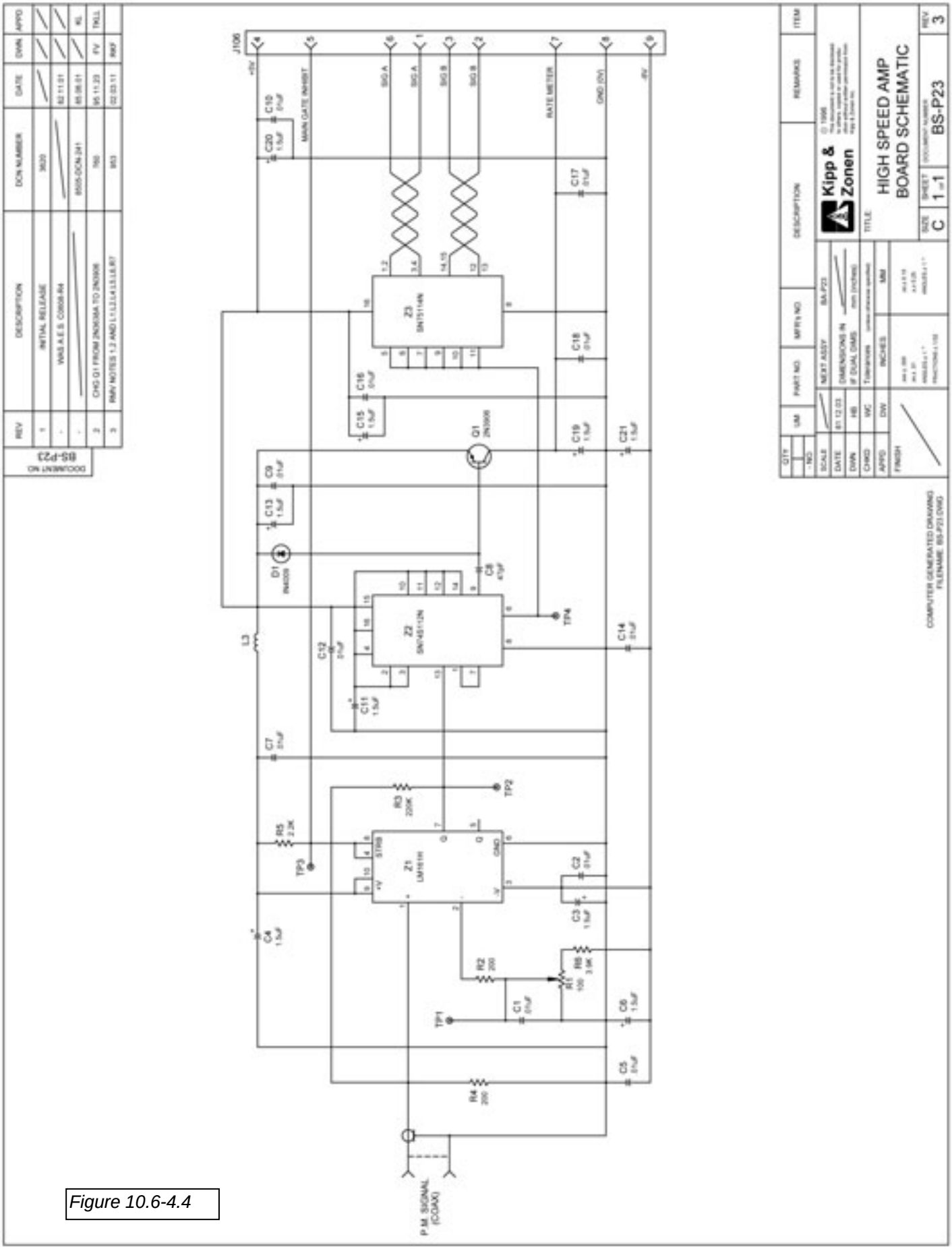


Figure 10.6-4.4

BREWER REFERENCE DOCUMENTATION

Section 10.7 Brewer Options

10.7.1 Option B - Azimuth Pointing System	**Figure**
- Azimuth Tracker and Stand	10.7-1.1
- Azimuth Tracker Unit Schematic BA-C91	10.7-1.2
- Azimuth Tracker Board Schematic BS-C99	10.7-1.3
- Azimuth Motor Wiring BA-W20	10.7-1.4
- Azimuth Power Supply Specifications	10.7-1.5
10.7.3 Heater Option	
- Assembly BA-C223	10.7-3.1
	10.7-3.2
10.7.4 Moisture Sensor	
- Assembly BA-E135	10.7-4
Section 10.8 Desiccant holder	
Assembly BA-C223	10.8

Section 10.9 Main Electronics Firmware / Configuration Loading Procedures

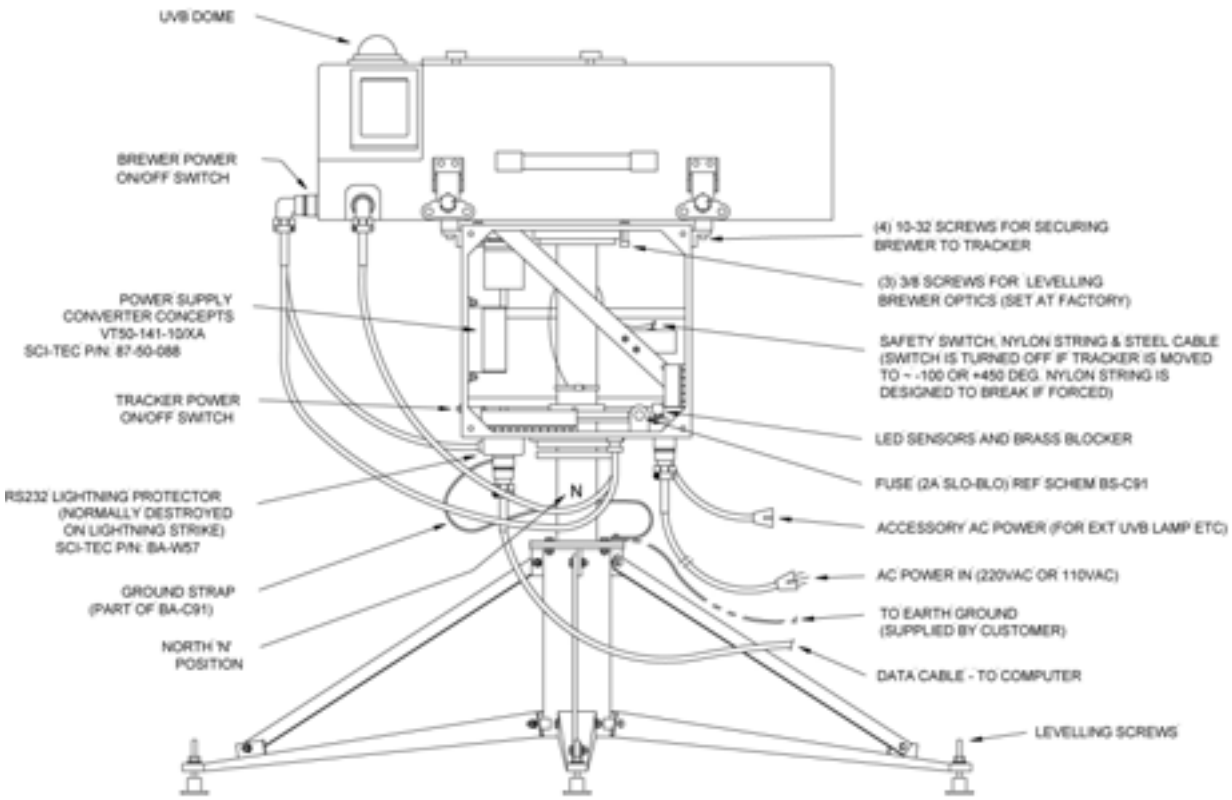

UVB DOME
BREWER POWER ON/OFF SWITCH
POWER SUPPLY CONVERTER CONCEPTS VT50-141-10/XA SCI-TEC P/N: 87-50-088
TRACKER POWER ON/OFF SWITCH
RS232 LIGHTNING PROTECTOR (NORMALLY DESTROYED ON LIGHTNING STRIKE) SCI-TEC P/N: BA-W57
GROUND STRAP (PART OF BA-C91)
NORTH 'N' POSITION
N
(4) 10-32 SCREWS FOR SECURING BREWER TO TRACKER
(3) 3/8 SCREWS FOR LEVELLING BREWER OPTICS (SET AT FACTORY)
SAFETY SWITCH, NYLON STRING & STEEL CABLE (SWITCH IS TURNED OFF IF TRACKER IS MOVED TO ~ -100 OR +450 DEG. NYLON STRING IS DESIGNED TO BREAK IF FORCED)
LED SENSORS AND BRASS BLOCKER
FUSE (2A SLO-BLO) REF SCHEM BS-C91
ACCESSORY AC POWER (FOR EXT UVB LAMP ETC)
AC POWER IN (220VAC OR 110VAC)
TO EARTH GROUND (SUPPLIED BY CUSTOMER)
DATA CABLE - TO COMPUTER
LEVELLING SCREWS

Figure 10.7-1.1

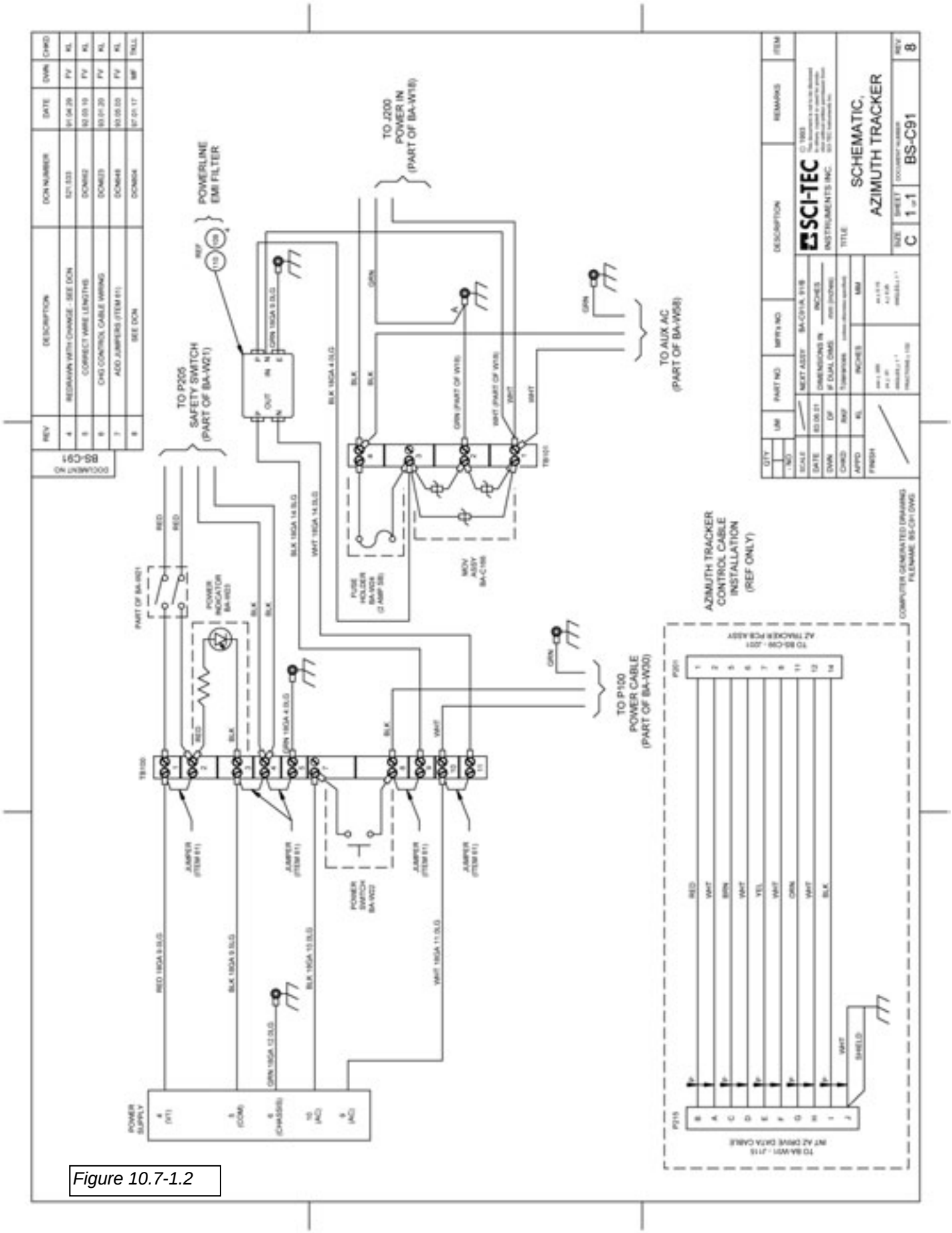


Figure 10.7-1.2

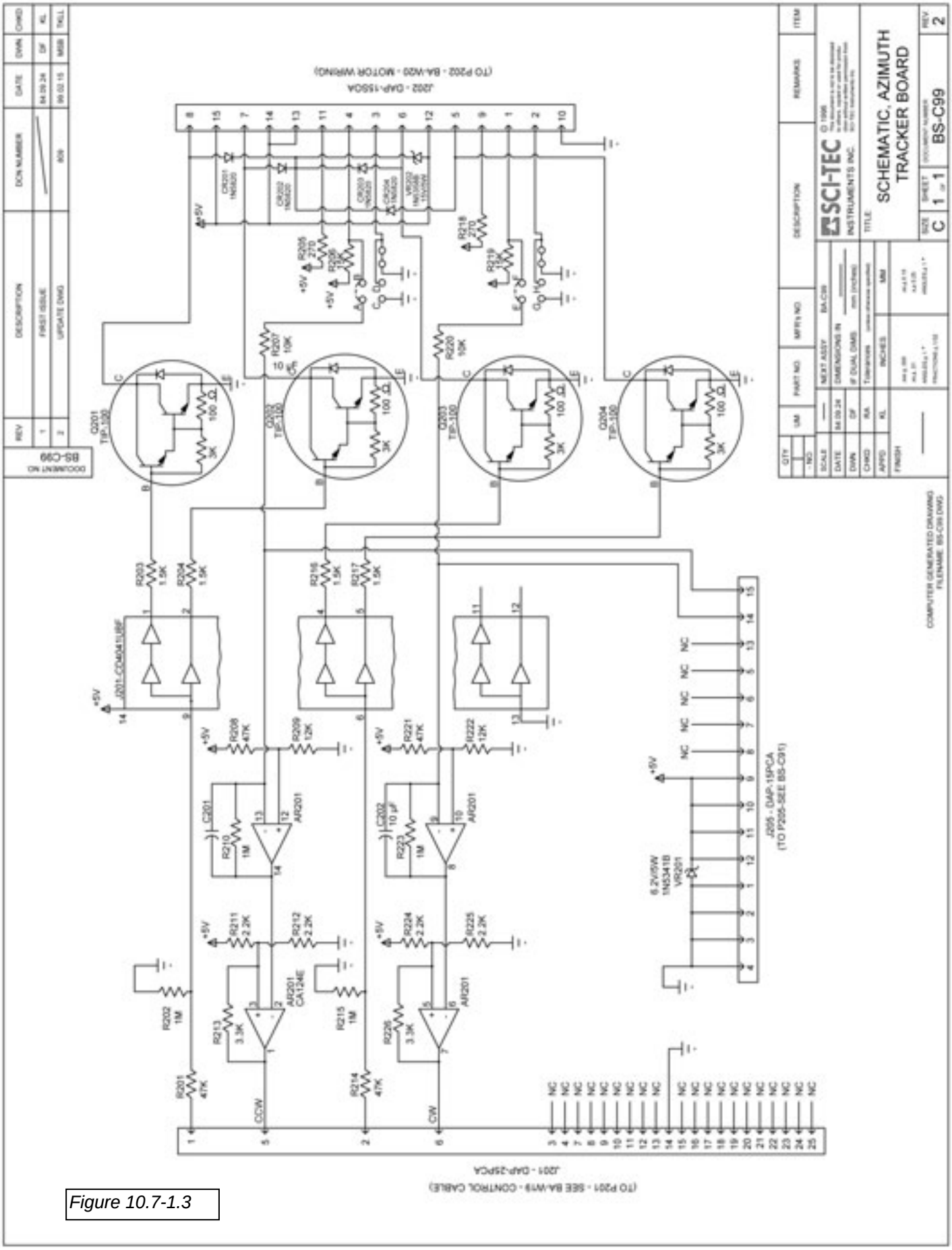


Figure 10.7-1.3

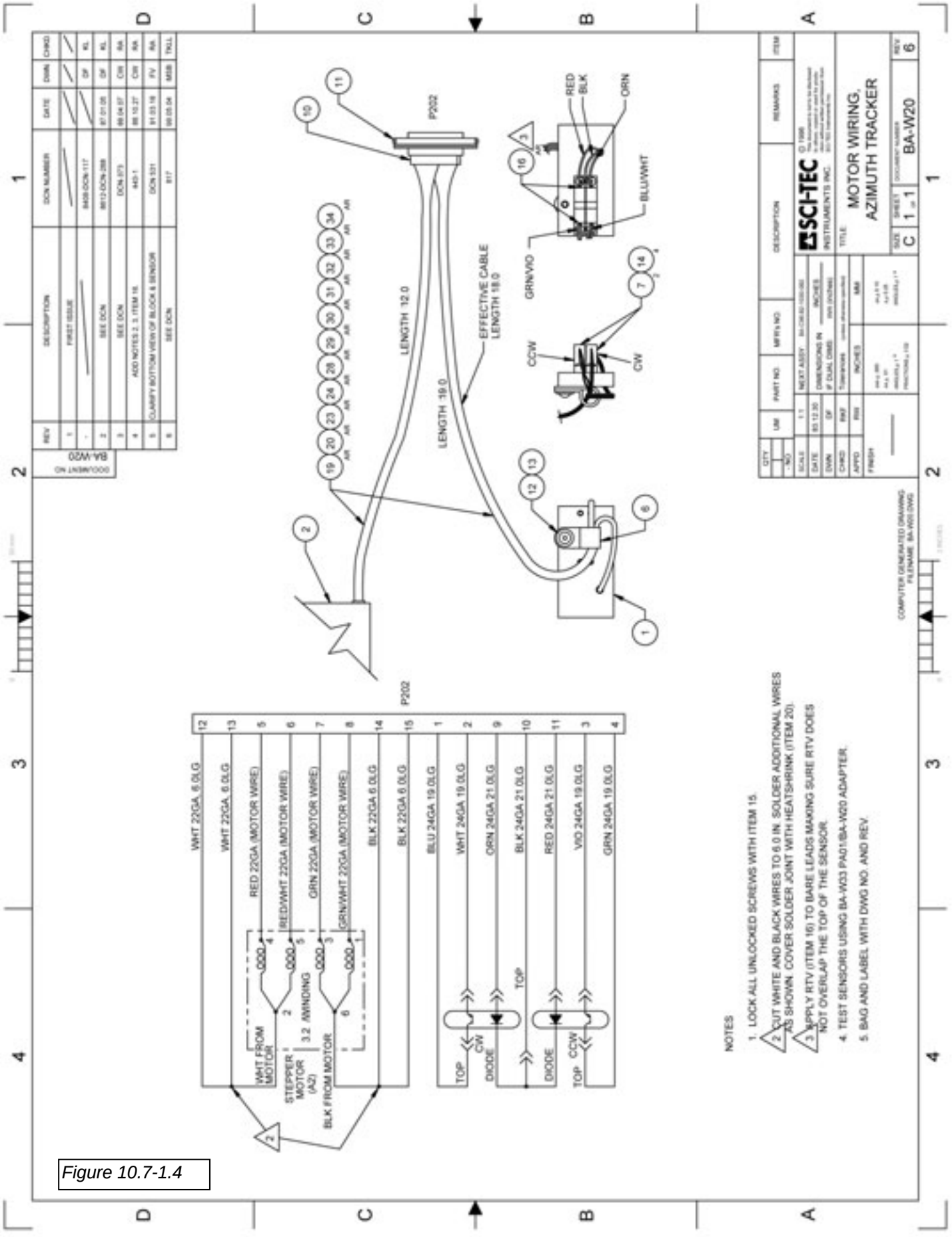


Figure 10.7-1.4

IDEAS THAT POWER TECHNOLOGY

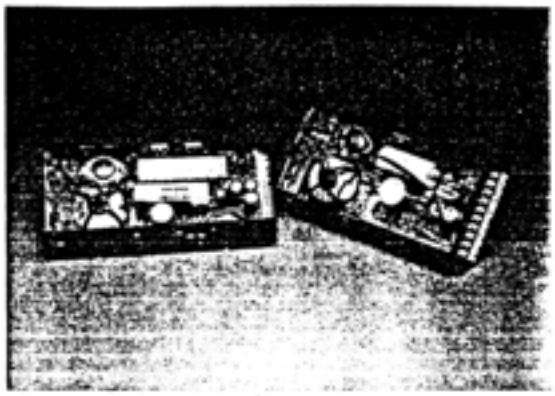
VT 50/VX 50
TECHNICAL DATA

CONVERTER CONCEPTS INC

SCI-TEC # 87-50-088
(VT50-141-10/XA)

FEATURES

- 50 Watt Switching Power Supply
- Single, Dual and Triple Output
- AC/DC or DC/DC Models Available
- Best Low DC Input-High Power Output Ratio
- Overvoltage Limit Protection
- UL Recognized



SPECIFICATIONS

Efficiency AC Input:
Single Output: 75% Typical 70% Min.
Multiple Output: 70% Typical 65% Min.
Efficiency DC Input:
Single Output: 75% Typical 55% Min.
Multiple Output: 70% Typical 50% Min.
Turn-On Overshoot: None
Turn-On Surge Current: Limited by active soft-start to 5A 1st cycle
Turn-On Time: 100 msec.
Hold-Up Time: 90 VAC Input (low line) 12 msec.
115 VAC Input (nominal line) 20 msec.
250 VAC Input 180 msec.
Ripple: 20 mV pk-pk Max.
Switching Noise: 2 MHz @ 20 kHz Rep. Rate; 100 mV pk-pk or 1%
Transient Response: 0.5V excursion for 50% to 100% or 100% to 50% load change with return to regulation in 2 msec. Load change 1 $A/_{\mu}$ sec.
Operating Temp: −20°C to +80°C Base Plate Full Load. −20°C to +55°C Free Air Full Load. Derate linearly to 50% output at 80°C
Temperature Coefficient: 0.02%/°C
Storage Temp: −55°C to +85°C
Isolation:

	Input	
Hipot	**AC**	**DC**
Input to Output	1.5kVAC	250 VDC
Input to Case	1.5kVAC	250 VDC
Output to Case	250 VDC	250 VDC

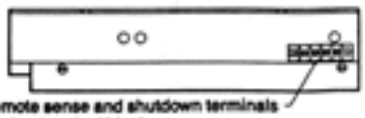
Shock & Vibration: Designed to withstand normal commercial shock and vibration conditions.
Short Circuit Protection: Current limited for overload and short circuit protection.
Multiple Output Regulation Specifications:
Regulation: Line, All Outputs: .3%
Regulation: Load, Output No. 1: 20% Load—Full Load 1%
Regulation: Load, All Other Outputs: 50 ma—Full Load 1.5%

	% of Full Load Current				
Output #1 load current	20	35	50	75	100
Each Auxiliary load current	50	75	100	100	100

Size: VT 50 2.063" x 4.187" x 8.063" (52.4 x 106.4 x 204.8 mm)
Size: VX 50 2.125" x 3.581" x 8.000" (54.0 x 91.0 x 203.2 mm)
Weight: 2.0 lbs. (0.91 kg)

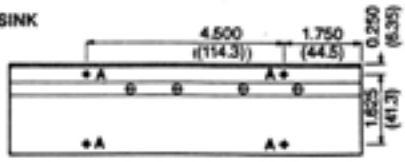
MECHANICAL DIMENSIONS

VT 50 OPEN FRAME & ENCLOSED MODULES
Four No. 8 mounting screws recommended

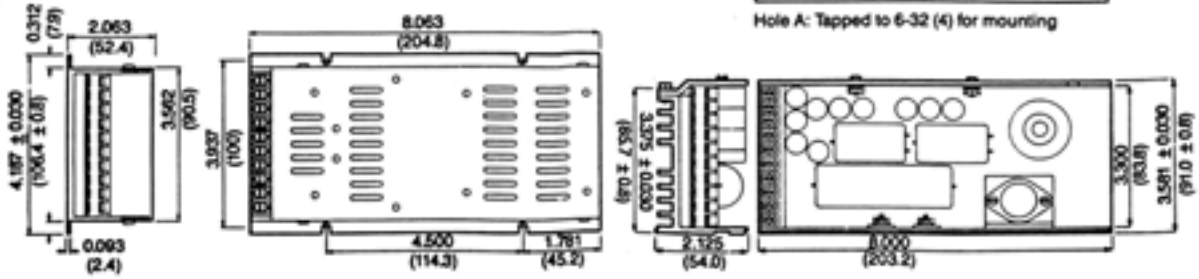


Optional remote sense and shutdown terminals
2-56 spade lug terminal block

VX 50 HEATSINK MODULES



Hole A: Tapped to 6-32 (4) for mounting



Dimensions shown in inches. Dimensions in parentheses ( ) indicate millimeters. Tolerance ±0.010 (0.3 mm) unless otherwise noted.

Figure 10.7-1.5

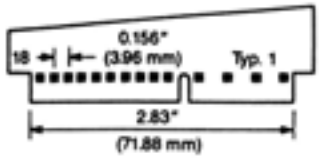
VT 50/VX 50

CONVERTER CONCEPTS
Industrial Parkway • Pardeeville, WI 53954
(608) 429-2144 • TWX 910-280-2630
Toll-Free 800/253-5227

TERMINATION OPTIONS

SCI-TEC #87-50-088 (VT50-141-10/XA)

SQUARE PINS (OPTIONAL)



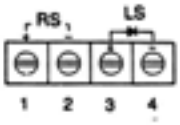
18. V3 Output
17. V4 Output
16. V4 Output
15. V2 Output
14. V2 Output
13. V1 Output
12. V1 Output
11. Ground
10. Ground
9. Chassis
8. Keyslot
7. – V Input
6. NC
5. + V Input
4. NC
3. AC Input
2. NC
1. AC Input

4-40 TERMINAL BLOCK (STANDARD)

TYPICAL

1. V3 Output
2. V4 Output
3. V2 Output
4. V1 Output
5. Return
6. Chassis
7. – DC Input
8. + DC Input
9. AC Input
10. AC Input

REMOTE SENSE AND LOGIC SHUTDOWN



1. RS +
2. RS –
3. LS +
4. LS –

Caution:
Shutdown Current 20mA max.

INPUT AND OUTPUT RANGES

INPUT VOLTAGE RANGE (SERIES SPECIFIC)

Input Option	Input Voltage Range AC	DC	Frequency in Hz	Input Fuse (User Provided)
1	90-250	100-350	44-440	1.0A Slow Blow Fuse
2		10-40		10.0A Slow Blow Fuse
3		20-60		5.0A Slow Blow Fuse

OUTPUT RANGE (SERIES SPECIFIC)

Model No.	Output	Volts	Amps	Adjustment
14	V1	+5	0-10	±10%
16	V1	+12	0-5	±10%
17	V1	+15	0-4	±10%
18	V1	+28	0-2	±10%
22	V1 V3	+5 –5	1.8-9 .05-1	±10% ±5% Fixed

Model No.	Output	Volts	Amps	Adjustment
24	V1 V2	+5 +12	1.6-8 .05-1	±10% ±5% Fixed
26	V1 V3	+12 –12	.6-3 .05-1	±10% ±5% Fixed
27	V1 V3	+15 –15	.4-2 .05-1	±10% ±5% Fixed
32	V1 V2 V3	+5 +12 –5	1.2-6 .05-1 .05-1	±10% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 –12	1-5 .05-1 .05-1	±10% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 –15	1-5 .05-.8 .05-.8	±10% ±5% Fixed ±5% Fixed

SELECTING A UNIT: VT 50/VX 50

Series	Rated Power	—	No. of Outputs	Output Range	Input	—	Package	Termination	/	Group 1 Options	Group 2 Options
X	X	—	X	X	X	—	X	X	/	X	X
VT Standard VX Heat Sink (open frame only)	50		1 2 3	2 4 6 7 8 See series specific output range	1 2 3 See series specific input range		0 Open Frame 1 Enclosed 2 P.C. Board	0 Terminal Block 1 Square Pin 2 Wire Holes Only		A B C D E F G H I J K See group 1 chart	A B C D E F G See group 2 chart

GROUP 1 OPTIONS	Remote Sense	Logic Shutdown	Overvoltage Shutdown Protection	Power Fail Detect
A	•			
B		•		
C			•	
D				•
E	•	•		
F	•		•	
G	•			•
H		•	•	
I		•		•
J	•	•	•	
K	•	•		•
X	No Options			

GROUP 2 OPTIONS	Trip-pad-Test	Reverse Polarity Protection	Thermal Shut-down
A	•		
B		•	
C			•
D	•	•	
E	•		•
F		•	•
G	•	•	•
X	No Options		

For all U.L. recognized products, the application criteria is available at customer request. This material will give additional guidelines for installation and operation as per Underwriters Laboratory.

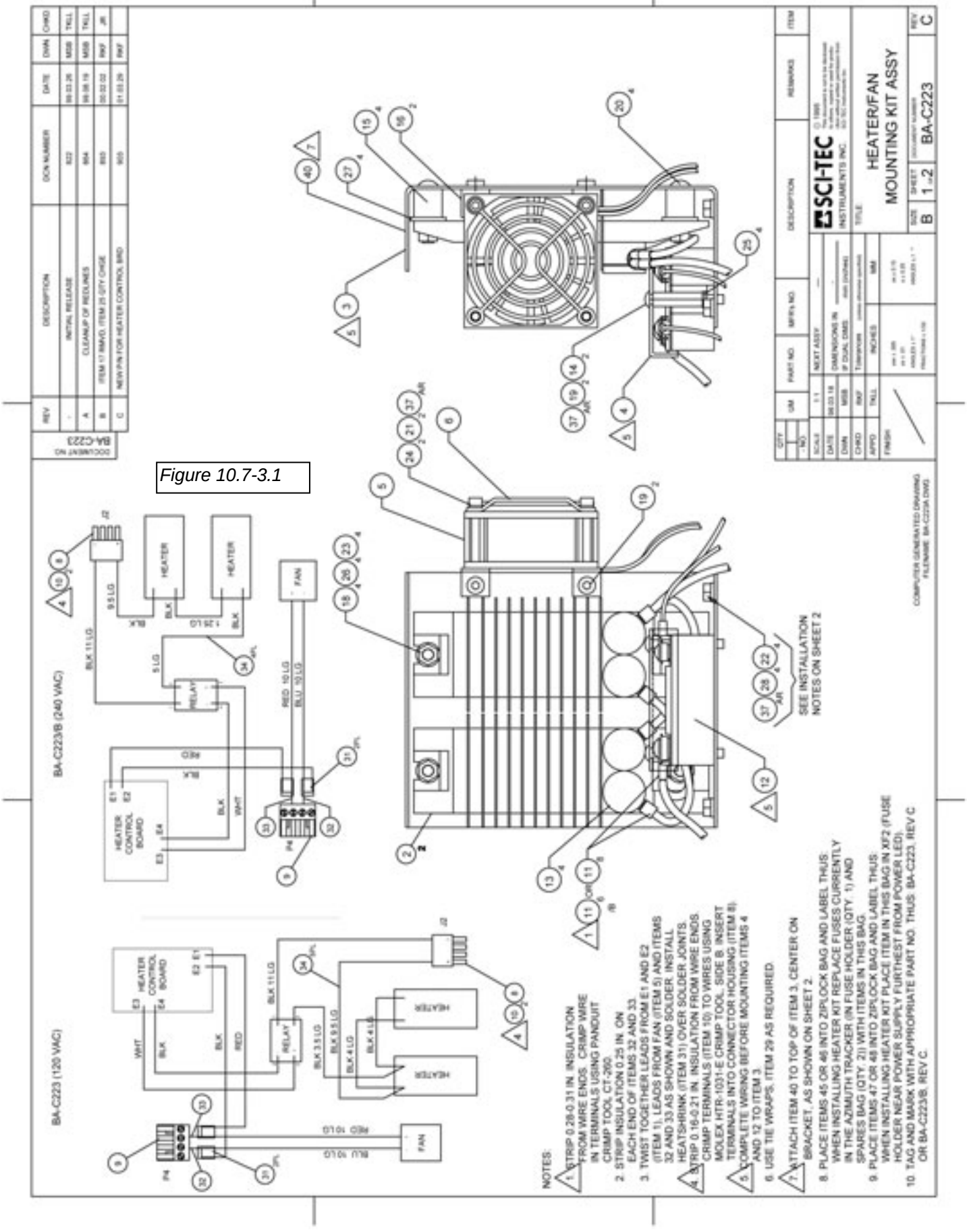


Figure 10.7-3.1

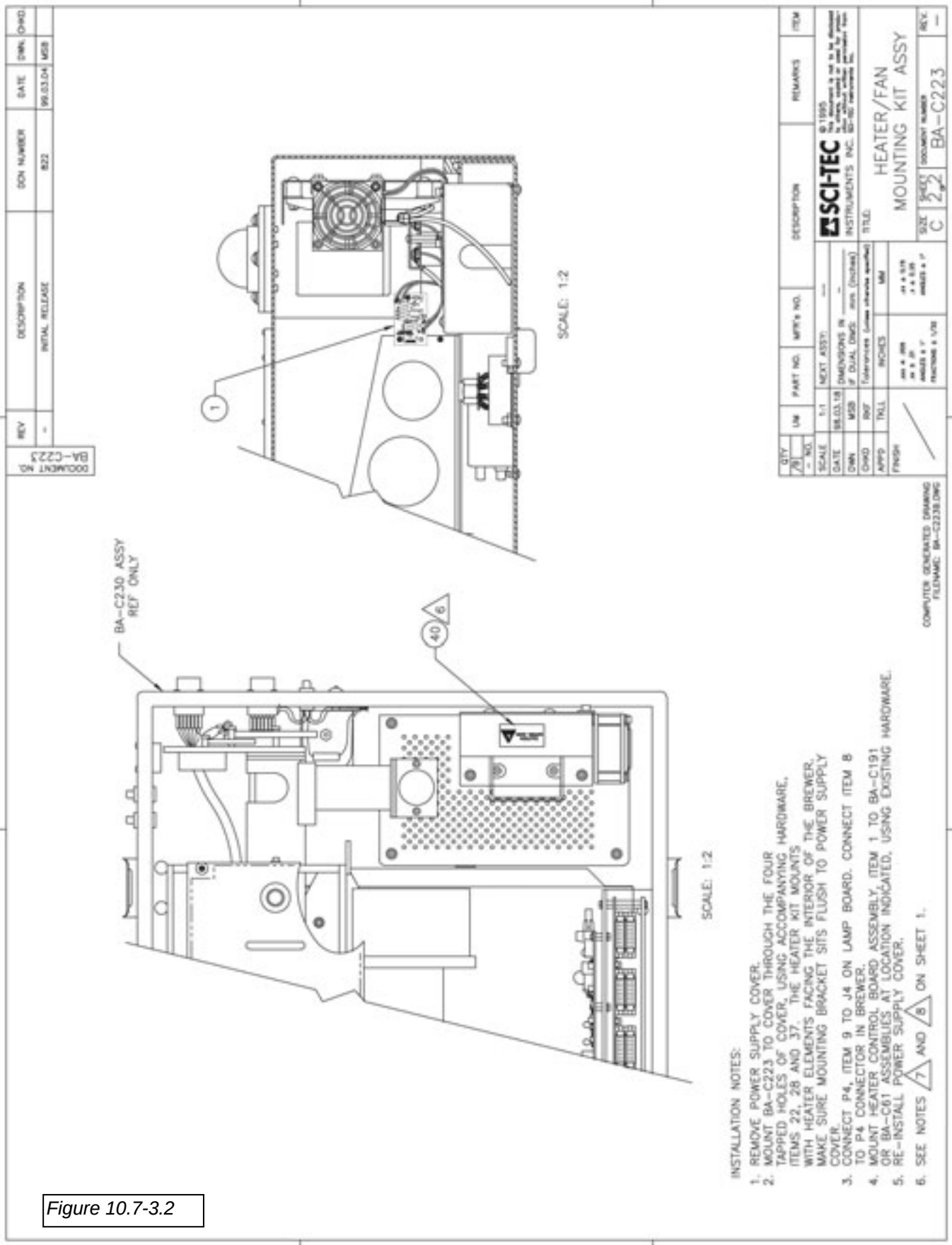
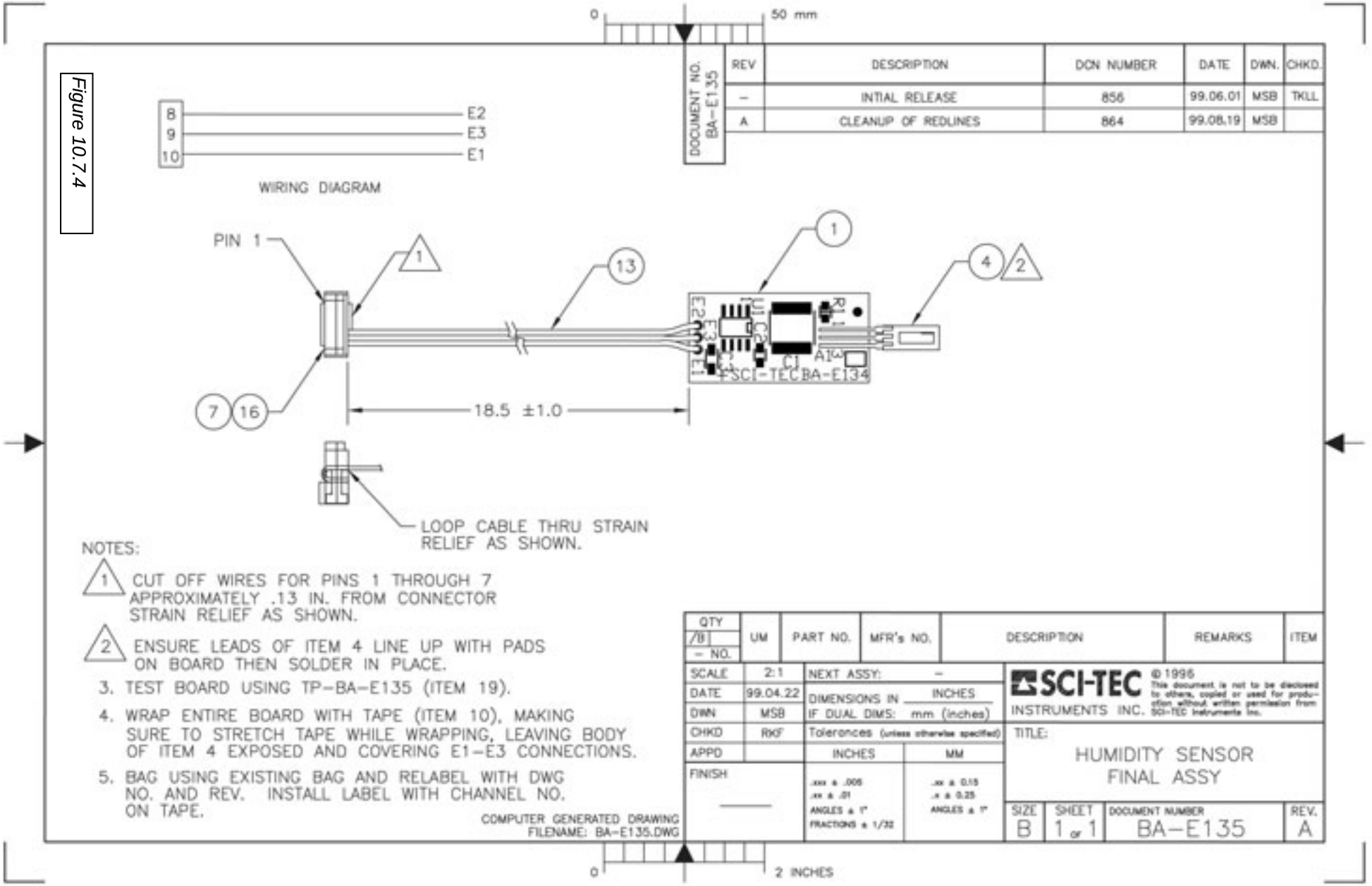

HEATER/FAN
MOUNTING KIT ASSY
BA-C223
SCI-TEC
INSTALLATION NOTES:
1. REMOVE POWER SUPPLY COVER.
2. MOUNT BA-C223 TO COVER THROUGH THE FOUR TAPPED HOLES OF COVER, USING ACCOMPANYING HARDWARE, ITEMS 22, 28 AND 37. THE HEATER KIT MOUNTS WITH HEATER ELEMENTS FACING THE INTERIOR OF THE BREWER. MAKE SURE MOUNTING BRACKET SITS FLUSH TO POWER SUPPLY COVER.
3. CONNECT P4, ITEM 9 TO J4 ON LAMP BOARD. CONNECT ITEM 8 TO P4 CONNECTOR IN BREWER.
4. MOUNT HEATER CONTROL BOARD ASSEMBLY, ITEM 1 TO BA-C191 OR BA-C61 ASSEMBLIES AT LOCATION INDICATED, USING EXISTING HARDWARE.
5. RE-INSTALL POWER SUPPLY COVER.
6. SEE NOTES 7 AND 8 ON SHEET 1.
SCALE: 1:2
SCALE: 1:2
BA-C230 ASSY
REF ONLY

Figure 10.7-3.2

Figure 10.7.4


0
50 mm
DOCUMENT NO. BA-E135
REV | DESCRIPTION | DCN NUMBER | DATE | DWN. | CHKD.
– | INTIAL RELEASE | 856 | 99.06.01 | MSB | TKLL
A | CLEANUP OF REDLINES | 864 | 99.08.19 | MSB |
8
9
10
E2
E3
E1
WIRING DIAGRAM
PIN 1
1
13
1
4
2
7
16
18.5 ±1.0
SCI-TEC BA-E134
LOOP CABLE THRU STRAIN RELIEF AS SHOWN.
NOTES:
1 CUT OFF WIRES FOR PINS 1 THROUGH 7 APPROXIMATELY .13 IN. FROM CONNECTOR STRAIN RELIEF AS SHOWN.
2 ENSURE LEADS OF ITEM 4 LINE UP WITH PADS ON BOARD THEN SOLDER IN PLACE.
3. TEST BOARD USING TP-BA-E135 (ITEM 19).
4. WRAP ENTIRE BOARD WITH TAPE (ITEM 10), MAKING SURE TO STRETCH TAPE WHILE WRAPPING, LEAVING BODY OF ITEM 4 EXPOSED AND COVERING E1-E3 CONNECTIONS.
5. BAG USING EXISTING BAG AND RELABEL WITH DWG NO. AND REV. INSTALL LABEL WITH CHANNEL NO. ON TAPE.
COMPUTER GENERATED DRAWING
FILENAME: BA-E135.DWG
QTY /B – NO. | UM | PART NO. | MFR's NO. | DESCRIPTION | REMARKS | ITEM
SCALE 2:1
DATE 99.04.22
DWN MSB
CHKD RKF
APPD
FINISH
NEXT ASSY: –
DIMENSIONS IN INCHES
IF DUAL DIMS: mm (inches)
Tolerances (unless otherwise specified)
INCHES: .xxx ± .005, .xx ± .01, ANGLES ± 1°, FRACTIONS ± 1/32
MM: .xx ± 0.13, .x ± 0.25, ANGLES ± 1°
SCI-TEC INSTRUMENTS INC.
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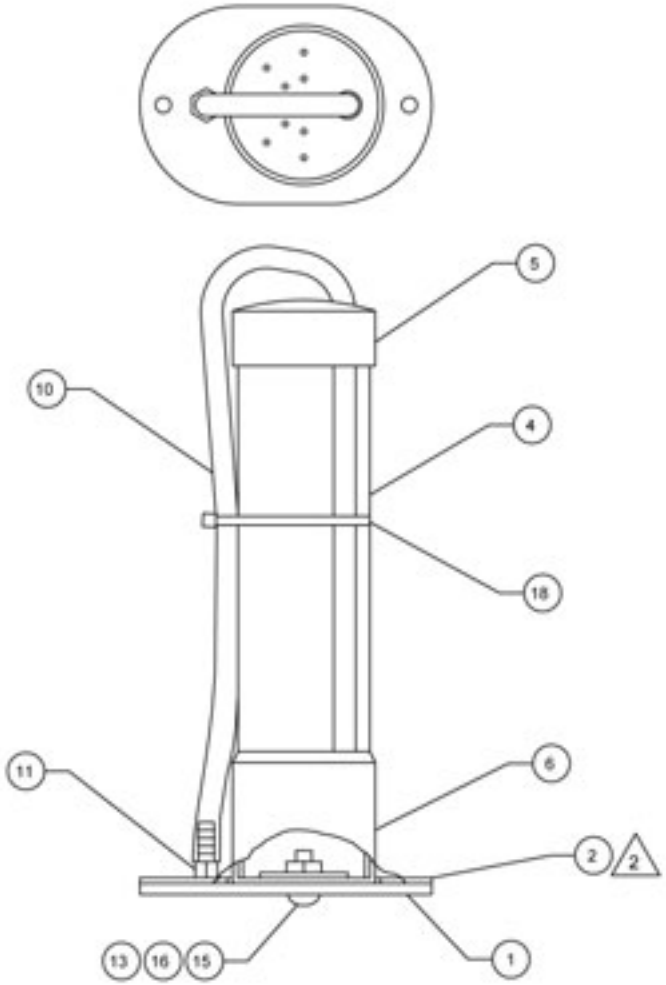
TITLE: HUMIDITY SENSOR FINAL ASSY
SIZE B | SHEET 1 of 1 | DOCUMENT NUMBER BA-E135 | REV. A
0
2 INCHES

Figure 10.8

DOCUMENT NO BA-C233	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	CHKD
	1	INITIAL RELEASE	900	00.05.19	RKF	BW
	2	CHANGE TO BOTTOM CAP AND GASKET	939	01.07.12	RKF	BW
	3	CHANGE TO TOP AND BOTTOM CAPS	951	02.04.29	RKF	



NOTES:

1. ATTACH ITEMS 8 AND 14 TO TUBE WITH TAPE FOR INSTALLATION OF CARTRIDGE AT NEXT ASSEMBLY LEVEL.
2. REMOVE PROTECTIVE BACKING FROM GASKET AND FIT AS SHOWN.
3. BAG AND LABEL THUS: BA-C233/A R3

PART NO.	NEXT ASSY
BA-C233/A	BA-C230, BA-C230/B BA-C231, BA-C112/B

COMPUTER GENERATED DRAWING
FILENAME: BA-C233.DWG

QTY - NO.	UM	PART NO.	MFR's NO.	DESCRIPTION	REMARKS	ITEM

SCALE	1:1	NEXT ASSY	SEE TABLE	Kipp & Zonen	© 2000 This document is not to be disclosed to others, copied or used for production without written permission from Kipp & Zonen Inc.
DATE	00.05.12	DIMENSIONS IN			
DWN	RKF	IF DUAL DIMS	mm (inches)		
CHKD	RKF	Tolerances (unless otherwise specified)		TITLE: DESICCANT HOLDER ASSY	
APPD	BW	INCHES	MM		
FINISH		.## ± .010 .### ± .002 ANGLES ± 1° FRACTIONS ± 1/32	## ± 0.10 ### ± 0.05 ANGLES ± 1°	SIZE C / SHEET 1 OF 1 / DOCUMENT NUMBER BA-C233 / REV 3	

KIPP & ZONEN
SINCE 1830

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Nuestro apoyo del cliente se queda a su disposición para cualquier mantenimiento o la reparación, la calibración, los suministros y reserva.

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